

# ***Exhibit A***

UNITED STATES BANKRUPTCY COURT  
SOUTHERN DISTRICT OF NEW YORK

-----X  
In re: : Chapter 11  
: Case No. 14-13200 (SHL)  
AEREO, INC., :  
Debtor. :

-----X  
**BROADCASTERS' MOTION TO WITHDRAW REFERENCE OF THE STAY  
RELIEF MOTION AND SALE MOTION AND MEMORANDUM IN SUPPORT**

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Broadcasters<sup>1</sup> respectfully move for entry of an order, pursuant to 28 U.S.C. § 157(d), withdrawing the reference to the Bankruptcy Court of both (A) Broadcasters’ Motion for Relief From Stay (the “Stay Relief Motion”); and (B) Aereo’s November 21, 2014 Motion to Approve Debtor’s Motion for Entry of an Order (i) Approving Bidding Procedures in Connection with the Proposed Sale(s) of Certain or Substantially All of the Debtor's Assets and Other Potential Transactions; (ii) Establishing Certain Related Deadlines; and (iii) Granting Related Relief (the “Sale Motion”). These matters should be decided by the District Court currently presiding over *American Broadcasting Companies, Inc., et al. vs. Aereo, Inc.*, Case No. 12 Civ. 1540 (AJN) (the “Copyright Case”). That court is already intimately familiar with Aereo’s retransmission service and the Broadcasters’ copyright infringement claims, and therefore can most efficiently rule upon the issues presented by these motions.

## **I. PRELIMINARY STATEMENT**

The reference of the Stay Relief Motion and the Sale Motion should be withdrawn so that they can be heard by the District Court in which the Copyright Case has been pending for nearly three years. The Stay Relief Motion, filed by Broadcasters, seeks relief from the automatic stay so that the District Court can render a final judgment on their copyright infringement claims against Aereo, enter a permanent injunction, and determine the amount of statutory damages to which Broadcasters are entitled. The Sale Motion, filed by Aereo, seeks approval for Aereo to elicit bids for the sale of its assets or, in the alternative, proposals under which Aereo could reorganize and remain in business by continuing to retransmit broadcast television programming.

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<sup>1</sup> Broadcasters are WNET, THIRTEEN, Fox Television Stations, Inc., Twentieth Century Fox Film Corporation, WPIX, LLC, Univision Television Group, Inc., The Univision Network Limited Partnership, Public Broadcasting Service, American Broadcasting Companies, Inc., Disney Enterprises, Inc., CBS Broadcasting Inc., CBS Studios Inc., NBCUniversal Media, LLC, NBC Studios, LLC, Universal Network Television, LLC, Telemundo Network Group LLC, WNJU-TV Broadcasting LLC, KSTU, LLC, KUTV Licensee, LLC and Fox Broadcasting Company.

Aereo's ability to remain in business depends entirely on the question of whether its business, including its anticipated time-delayed retransmission service, infringes Broadcasters' copyrights. The Sale Motion is thus inextricably bound up with the underlying infringement issues that the District Court was poised to rule upon when Aereo filed bankruptcy.

Judicial efficiency overwhelmingly favors the District Court deciding these motions. The District Court already possesses extensive knowledge about the copyright litigation: It has been presiding over that case for years, including substantial motion practice and voluminous discovery; it has expertise in the copyright issues; and it issued the preliminary injunction currently in effect. By contrast, this bankruptcy case was filed only a few weeks ago and is still in its infancy. For these reasons, it would be substantially more efficient for the District Court to rule on the motions given that they raise issues with which the District Court is already deeply familiar. Accordingly, for the reasons discussed in detail below, Broadcasters respectfully request that the Court withdraw the reference of the Stay Relief Motion and Sale Motion.

## **II. BACKGROUND**

The Copyright Case began nearly three years ago when Aereo announced that it had invented a new technology that supposedly would allow it to retransmit Broadcasters' copyrighted broadcast television programs over the Internet to paying Aereo subscribers without first obtaining a copyright license. Aereo contended that its system – a collection of mini-antennas, transcoders, and computer components – fell within a loophole in the Copyright Act created by the Second Circuit's decision in *Cartoon Network LP, LLLP v. CSC Holdings, Inc.*, 536 F.3d 121 (2d Cir. 2008) ("*Cablevision*"). The District Court denied Broadcasters' preliminary-injunction motion because it found itself bound by the Second Circuit's interpretation of the relevant provision of the Copyright Act in the *Cablevision* case. See Dist.

Dkt. No. 109 at 18-19.<sup>2</sup>

As the parties continued to litigate over the next several years, Aereo continued to retransmit Broadcasters’ programs – 24 hours a day, seven days a week – to consumers who paid a subscription fee, expanding its initial New York service into Boston, Cincinnati, Denver, Detroit, and other locations across the country. While it was in operation, Aereo retransmitted thousands of Broadcasters’ copyrighted programs to its subscribers without authorization on both a near-live and time-delayed basis.

In June of 2014, the Supreme Court held that Aereo was infringing Broadcasters’ copyrights by publicly performing their programs, and it rejected the notion that Aereo’s technology, based principally on mini-antennas and playback from subscriber-associated copies of television programs, shielded it from liability. *Aereo III*, 134 S. Ct. at 2506-10. The Supreme Court was also clear that Aereo publicly performed the programs when it transmitted those programs to its subscribers and *regardless of when its subscribers watched them*. Observing that “Aereo’s subscribers may receive the same programs at different times,” the Supreme Court held that this “does not help Aereo . . . [because] the Transmit Clause expressly provides that an entity may perform publicly ‘whether the members of the public capable of receiving the performance . . . receive it in the same place or in separate places and at the same time or at *different times*.’” *Id.* at 2510 (emphasis added) (quoting 17 U.S.C. § 101). This aspect of the opinion is significant because Aereo claims that, despite the Supreme Court opinion, it can retransmit Broadcasters’ programming without infringing copyright as long as it does so on a time-delayed basis. See, e.g., Dist. Dkt. No. 325 at 22-25.

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<sup>2</sup> “Dist. Dkt.” refers to the docket in *American Broadcasting Companies, Inc., et al. vs. Aereo, Inc.*, Case No. 12 Civ. 1540 (AJN).

Consistent with the Supreme Court’s ruling, on October 23, 2014, the District Court issued an order preliminarily enjoining Aereo from publicly performing Broadcasters’ programs without authorization, and rejected Aereo’s after-the-fact defenses under Section 111 of the Copyright Act and the DMCA.<sup>3</sup> Dist. Dkt. 341 at 4-11. Because Broadcasters had originally only sought to preliminarily enjoin Aereo from retransmitting their programs while the programs were still airing, the preliminary-injunction order did not cover Aereo’s delayed retransmissions. See Dist. Dkt. No. 341 at 15. The District Court was clear, however, that given the long history of this litigation and extensive discovery that had already occurred, it intended to render judgment on the merits and resolve all disputes about the scope of the permanent injunction – including, specifically, whether Aereo would be barred from making time-delayed retransmissions – on an expedited basis on summary judgment. See *id.* at 15, 16. Broadcasters requested that summary judgment motions be filed as early as November 26, but because Aereo professed to want to engage in additional expert discovery, the Court set a discovery deadline of January 16, 2015, and a deadline for summary judgment and Daubert motions of February 16, 2015. Dist. Dkt. No. 352.

However, less than one week after the District Court issued its schedule, Aereo filed for bankruptcy, invoking the protections of the automatic stay. Almost immediately, Aereo moved the Bankruptcy Court to approve an auction sale of substantially all of its assets. Aereo’s Sale Motion states that it intends not only to elicit bids for its assets, but also for “alternative proposals for reorganization” including “the ability to consummate a transaction that would permit the Debtor, in its business discretion, to decide to sponsor a plan of reorganization that

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<sup>3</sup> Specifically, Aereo claimed that it was entitled to a statutory license under Section 111 of the Copyright Act, and that its conduct fell within certain “safe harbor” provisions contained in the Digital Millennium Copyright Act.

permits the successful bidder to acquire all of the stock in the reorganized Debtor as an alternative to purchasing the Debtors' assets." Sale Motion, pp. 8-9, ¶ 19.

Aereo has emphasized in the media that it may "end up deciding to restructure the company and attracting new capital." Declaration of Natasha Labovitz ("Labovitz Decl."), Ex. A (Bloomberg Trans. at 27). And Aereo insists under oath that it may be able to continue some or all aspects of its retransmission business. Declaration of Ramon Rivera dated November 20, 2014, ¶¶ 27, 30 (stating that resolution of "legal and regulatory issues relating to" Aereo's business may allow Aereo to continue "to be able to operate profitably"). Although the District Court has already conclusively rejected Aereo's argument that it is entitled to a compulsory statutory license under Section 111 of the Copyright Act, see Dist. Dkt. No. 341 at 4-10, Aereo avers in its Sale Motion that it "has taken the position that it is entitled to a 'compulsory' statutory license under Section 111 of the Copyright Act" and "has filed documents and payments with the United States Copyright Office which, if accepted, would result in there being no copyright infringement claim against the debtor." Sale Motion at 6-7.

Aereo has been open about the fact that it is using the bankruptcy to evade the rulings already made in the litigation so that it can either keep operating or sell its technology to a third party to pick up where Aereo left off. Aereo's Kanojia has publicly stated "it was clear that we had to deal with the litigation in some way, shape or form," and therefore "it made sense to look at Chapter 11 as kind of a way to deal with the litigation issues and at least unencumber the assets, which are truly valuable." See Labovitz Decl., Ex. A (Bloomberg Trans. at 22).

### **III. THE REFERENCE SHOULD BE WITHDRAWN AS TO THE STAY RELIEF MOTION AND THE SALE MOTION.**

#### **A. The Reference Should Be Withdrawn As To Both Motions For Cause.**

The automatic reference to the Bankruptcy Court of both the Stay Relief Motion and the Sale Motion should be withdrawn “for cause” under 28 U.S.C. § 157(d) so that the District Court can rule on both of these motions. In evaluating whether “cause” exists, courts in this circuit weigh a number of factors, including: (1) whether the claim is core or non-core, (2) what is the most efficient use of judicial resources, (3) what is the delay and what are the costs to the parties, (4) what will promote uniformity of bankruptcy administration, (5) what will prevent forum shopping, and (6) other related factors. *Orion Pictures Corp. v. Showtime Networks, Inc. (In re Orion Pictures Corp.)*, 4 F.3d 1095, 1101 (2d Cir. 1993).

The foremost concern here is efficiency. As explained in the Stay Relief Motion, allowing the parties to file summary judgment motions and obtain a final judgment on the merits of Broadcasters’ copyright claims and Aereo’s defenses will provide needed clarity in the bankruptcy case. As it stands right now, Aereo has proposed in its Sale Motion and in other documents filed in the Bankruptcy Court that it may reorganize and continue to operate. *See, e.g.,* Sale Motion at p. 6, ¶ 12 and pp. 8-9, ¶ 19. Aereo contends that it can continue to provide its retransmission service without infringing Broadcasters’ copyrights so long as it retransmits the programs on a time delay (i.e., at some unspecified time after the programs begin airing).<sup>4</sup> This issue must be addressed if Aereo is going to reorganize, because the Bankruptcy Court cannot approve a plan in which the debtor uses the assets in a way that violates the law. *See* 11 U.S.C. § 1129(a)(3). Likewise, if Aereo’s proposed business model is illegal, such a plan could not possibly qualify as feasible. *See* 11 U.S.C. § 1129(a)(11). Because the District Court is intimately familiar with Aereo’s business and the copyright issues, that court is best situated to determine whether lifting the stay to adjudicate the scope of Aereo’s liability is warranted in

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<sup>4</sup> As mentioned above, Aereo also still contends that it is entitled to a compulsory license under Section 111, even though the District Court has rejected that claim. *See* Sale Motion at 6-7.

light of the positions Aereo is taking in the bankruptcy – not to mention Broadcasters’ right to a final adjudication, permanent injunction, and statutory damages after nearly three years of litigation and ongoing infringement. *See Crown Heights Jewish Cmty. Council, Inc. v. Fischer (In re Fischer)*, 202 B.R. 341, 354 (E.D.N.Y. 1996) (holding that “the totality of the circumstances militates strongly in favor” of allowing the district court to decide motion to lift the stay as to pending RICO lawsuit against the debtor, because the lawsuit had been pending in the district court for more than four years, and “extensive work [had been] done by the magistrate judge, discovery has progressed significantly, and numerous substantive motions already have been decided”); *cf Davis v. All Points Packaging and Distribution, Inc. (In re Quebecor World (USA))*, No. 12 Civ. 0888(AJN), 2012 WL 11088343, at \*2 (S.D.N.Y. Jul. 6, 2012) (Nathan, J.) (efficiency and uniformity dictate that the reference should not be withdrawn where, unlike here, the bankruptcy case had been pending for over two years and the district court had not presided over any proceedings. This case is the converse and all the factors and reasoning of the Court militate in favor of withdrawal).

Moreover, expeditious resolution of this issue will facilitate an asset sale because it will provide clarity as to how a potential buyer can use Aereo’s assets. It is already clear that if the purchaser of Aereo’s technology uses it to retransmit Broadcasters’ programs without authorization during the broadcast window, the purchaser will be liable for copyright infringement. *Aereo III*, 134 S. Ct. at 2506-10 (holding that using Aereo’s technology to retransmit broadcast television programs is copyright infringement). Once the District Court confirms that unauthorized time-delayed retransmissions made with Aereo’s technology infringe, any purchaser who uses that technology to offer a time-delayed retransmission service will similarly be liable for copyright infringement. *See id.* at 2510. Aereo undoubtedly will object,

saying such clarification is unnecessary. But Aereo should not be allowed to use its bankruptcy to evade resolution of the time-delayed retransmission issue. The integrity of the sales process and of the bankruptcy court will only suffer if that occurs. Thus, the determination of the Sale Motion is tied to the resolution of the Copyright Case and should be decided by the District Court.

Withdrawing the reference will not cause any delay. To the contrary, it will facilitate the efficient resolution of these motions because the District Court is already familiar with the underlying factual and legal issues. As Aereo attempts to sell its assets, it is much more efficient and orderly to determine first the scope of what is and is not prohibited with respect to the use of those assets. And it is clear that the District Court, which was already close to making that determination, is in the best position to make it quickly and efficiently.

Moreover, allowing the District Court to decide these motions will prevent forum shopping. The Copyright Case has been pending in the District Court for years, and was on the brink of a final judgment when Aereo filed for bankruptcy – a move it has all but admitted was calculated to get out of District Court. And it is now asking, or presumably intends to ask, the Bankruptcy Court to provide relief from Broadcasters’ copyright claims, including permission to reorganize and continue operating an unauthorized retransmission service. This is rank forum shopping because issues relating to Aereo’s infringement and continuing ability to retransmit Broadcasters’ copyrighted programs belong in the District Court. Aereo’s forum shopping weighs in favor of withdrawing the reference. *See, e.g., McMahon v. Providence Capitol Enters., Inc. (In re McMahon)*, 222 B.R. 205, 208 (S.D.N.Y 1998) (“Forum shopping would not be encouraged by granting the Defendant's motion [to withdraw the reference] as this case

involves a non-core proceeding that could have and probably should have been brought in a district court originally.”).

**B. The Sale Motion Is Subject To Mandatory Withdrawal Of The Reference.**

In addition to being subject to withdrawal for cause, Aereo’s Sale Motion is also subject to mandatory withdrawal of the reference. Section 157(d) of the Judicial Code provides that:

The district court *shall*, on timely motion of a party, so withdraw a proceeding if the court determines that *resolution of the proceeding requires consideration of both title 11 [the Bankruptcy Code] and other laws of the United States regulating organizations or activities affecting interstate commerce.*

28 U.S.C. § 157(d) (emphasis added).

Withdrawal is mandatory when the resolution of the proceeding requires consideration of federal, non-bankruptcy law, i.e., “other laws of the United States regulating organizations or activities affecting interstate commerce.” 28 U.S.C. § 157(d). Section 157(d) requires withdrawal of the reference of any proceeding that involves “significant interpretation, as opposed to simple application, of federal laws apart from the bankruptcy statutes.” *City of New York v. Exxon Corp.*, 932 F.2d 1020, 1026 (2d Cir. 1991). Accordingly, a motion for withdrawal must be granted whenever “substantial and material consideration of non-Bankruptcy Code federal statutes is necessary for resolution of the proceeding.” *Shugrue v. Air Line Pilots Ass’n, Int’l (In re Ionosphere Clubs, Inc.)*, 922 F.2d 984, 995 (2d Cir. 1990). The reference has been withdrawn in cases in this District that require the Bankruptcy Court to “engage itself in the intricacies” of non-bankruptcy law, as opposed to routine application of those laws. *See In re Dana Corp.*, 379 B.R. 449, 453 (S.D.N.Y. 2007) (*quoting Shugrue*, 922 F.2d at 995) (withdrawing the reference where the case would have required the bankruptcy court to “engage in careful and significant consideration of . . . a statute outside its realm of experience” (internal quotation marks omitted)); *Chemtura Corp. v. United States*, No. 10 Civ. 503(RMB), 2010 WL

1379752, at \*1 (S.D.N.Y. Mar. 26, 2010) (citations omitted) (withdrawing an adversary proceeding “because it implicate[d] consideration and analysis of [a federal statute] and ‘the intricacies’ of non-Bankruptcy law” (internal quotation marks omitted)); *accord Enron Power Mktg., Inc. v. Cal. Power Exch. Corp. (In re Enron Corp.)*, No. 04 Civ. 8177(RCC), 2004 WL 2711101, at \*4 (S.D.N.Y. Nov. 23, 2004) (withdrawing the reference where the bankruptcy court could not adjudicate the issue “without substantial and material consideration of federal law beyond Title 11”). A determination as to whether withdrawal of the reference is mandatory does not require the court to evaluate the merits of the parties’ positions; rather, it is sufficient for the court to determine that the proceeding will involve “substantial and material consideration” of federal non-bankruptcy law. *See Grede v. Fortis Clearing Ams. LLC*, No. 09 C 138, 2009 WL 3518159, at \*3-4 (N.D. Ill. Oct. 28, 2009). “Section 157(d) reflects Congress’s perception that specialized courts should be limited in their control over matters outside their areas of expertise.” *AT&T Co. v. Chateaugay Corp.*, 88 B.R. 581, 583 (S.D.N.Y. 1988).

Aereo’s Sale Motion is subject to mandatory withdrawal because it requires consideration of both the Copyright Act and the Bankruptcy Code. As explained above, the Sale Motion contemplates that Aereo may ask the bankruptcy court to approve a restructuring transaction that might lead to confirmation of a plan allowing Aereo to remain in business. In such a case, it will be necessary to decide the scope of the permanent injunction so that Aereo’s future business plan complies with applicable law and is feasible. *See* 11 U.S.C. § 1129(a)(3), (11). Because determination of those issues require consideration of the Copyright Act and the Bankruptcy Code, withdrawal of the reference is mandatory. Likewise, if Aereo proposes to sell its assets to a third party, a final ruling on the copyright infringement issues will facilitate the sales process

by providing clarity for the buyer as to whether or not it can legally use Aereo's technology to offer a time-delayed retransmission service.

Finally, there is no reason to delay the decision on this motion or the related motion for relief from the automatic stay. Once Aereo decides on its preferred exit strategy, it is likely to argue (as many debtors do) that it is imperative that the bankruptcy court approve what it wants to do on an expedited basis. For example, Aereo's Sale Motion asks the court to approve bidding procedures for an asset sale or alternative transaction (such as a reorganization) that gives creditors less than one day to object to the proposed transaction. *See* Sale Motion, p. 8, ¶¶ 17(b) and (c). Waiting to modify the stay for purposes of addressing the delayed retransmission and other copyright issues will inevitably result in Aereo claiming that there is no time to give Broadcasters their day in court. By modifying the stay now, and allowing the briefing to proceed on the District Court's current schedule (or some modified, expedited schedule if Aereo wants that), the Court ensures that the Broadcasters' interests are protected while allowing Aereo's case to move expeditiously.

#### IV. CONCLUSION.

For the foregoing reasons, Broadcasters request that the reference of the Stay Relief Motion and Sale Motion be withdrawn pursuant to 28 U.S.C. § 157(d), and that Broadcasters be granted all other and further relief as the Court deems just and proper.

Respectfully submitted,

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UNITED STATES BANKRUPTCY COURT  
SOUTHERN DISTRICT OF NEW YORK

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In re:	:	Chapter 11
	:	Case No. 14-13200 (SHL)
AEREO, INC.,	:	
	:	
<i>Debtor.</i>	:	
-----X		

**DECLARATION OF M. NATASHA LABOVITZ IN SUPPORT OF THE  
BROADCASTERS' MOTION FOR RELIEF FROM THE STAY AND  
MOTION TO WITHDRAW REFERENCE OF THE STAY RELIEF  
MOTION AND SALE MOTION**

I, M. Natasha Labovitz, hereby declare that the following is true and correct to the best of my knowledge, information and belief:

1. I am a partner in the New York, New York office of the firm of Debevoise & Plimpton LLP.
2. I am an attorney duly licensed in and am a member in good standing of the bar for the State of New York and am admitted to the Southern District of New York, among other courts.
3. I submit this Declaration in support of the Broadcasters' Motion for Relief from the Stay and Motion to Withdraw Reference of the Stay Relief Motion and Sale Motion.
4. On November 25, 2014, Aereo, Inc. CEO Chet Kanojia was interviewed on the Bloomberg TV television channel. I hereby certify that Exhibit A annexed hereto and designated

as Broadcasters Exhibit 1 includes true and correct copies of transcripts of that interview in two segments as retrieved from the LexisNexis research service.

5. On November 17, 2011, Chet Kanojia and Joseph Lipowski, with Aereo, Inc. as the assignee, filed patent application no. 13/299,198 for a “method and system of capturing, storing, and streaming over the air broadcasts based on user requests.” Patent no. US 8,787,975 B2 for that method and system was granted on July 22, 2014. I hereby certify that Exhibit B annexed hereto and designated as Broadcasters Exhibit 2 is a true and correct copy of that patent, as retrieved from the public retrieval system of the United States Patent and Trademark office.

I declare under penalty of perjury that the foregoing is true and correct.

Dated: December 11, 2014

Respectfully submitted,

/s/ M. Natasha Labovitz

M. Natasha Labovitz

# *Exhibit A*

10 of 20 DOCUMENTS

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Analyst Wire

November 25, 2014 Tuesday

**SECTION:** ISSN: 1528-9958

**ACC-NO:** 66529

**LENGTH:** 1745 words

**HEADLINE:** Aereo Founder & CEO Chet Kanojia Intvd on Bloomberg TV

**BODY:**

(This is not a legal transcript. Bloomberg LP cannot guarantee its accuracy.)

CHET KANOJIA, CEO & FOUNDER, AEREO, IS INTERVIEWED ON BLOOMBERG TV

NOVEMBER 25, 2014

SPEAKERS: CHET KANOJIA, CEO & FOUNDER, AEREO

BETTY LIU, BLOOMBERG NEWS

[\*] BETTY LIU, BLOOMBERG NEWS: Moving and shaking this morning on another front, Aereo CEO and founder Chet Kanojia. Last week, it was lights out for the company, filing Chapter 11, after the Supreme Court this summer ruled Aereo violated copyright rules. Well, the move was seen as a victory in the television and cable industry to broadcast giants who lobbied against the service, including CBS chief Les Moonves, who once called the company a pimple.

Well, Aereo told the bankruptcy judge there's still plenty of interest in the company's assets. Remember, that this is backed by Barry Diller. And since the Supreme Court decision, HBO, Showtime, and CBS have introduced their own plans for video streaming services.

So in an exclusive interview looking back at Aereo's three year journey, I asked Chet how he felt about Moonves now doing exactly what he was trying to do.

(BEGIN VIDEOTAPE)

Aereo Founder & CEO Chet Kanojia Intvd on Bloomberg TV Analyst Wire November 25, 2014 Tuesday

CHET KANOJIA, CEO & FOUNDER, AEREO: Yes, I think if they had done all of that before we existed, it would have saved me a lot of time and money.

(LAUGHTER)

KANOJIA: Because all these consumers that want to buy -- be able to have the flexitive -- of -- be able to buy a la carte and, you know, do all these things, it would have been great.

LIU: So you would not have started Aereo if that had happened?

KANOJIA: The reason for Aereo was a very simple analysis of the market that said cord cutting is rising, there is an increase in people that are not taking the MVPD bundle. There is an opportunity that probably is in the 10 to 20 percent of the marketplace. It sounds like a lot of, you know, opportunity to do something, right?

So that was the -- the origin. It had nothing to do with fighting with anybody.

LIU: Right.

KANOJIA: And people that, you know, Barry is probably in a similar mode, where his customers online, you know, whether it's "Mash" or "College Humor" or all of these, they tend to skew very young. And they're seeing the same trends that pretty much everybody is seeing.

So it made perfect sense, as a market, opportunity to think about that. I don't know whether the price points are right or wrong. I don't know if the consumer is going to be motivated to say, you know, that -- people should know that...

LIU: I'll pay \$15 for HBO?

KANOJIA: For HBO or maybe \$10 or maybe \$8 or -- I don't know. It's going to get all sorted out. I think the market will take care of itself.

But I find it ironic that the same set of folks that said a la carte is bad and we would never ever, ever, ever do this are now basically saying, yes, we acknowledge that there is a certain population of people -- and a growing population, meaningful enough for a large company to care -- that want to consume it in this fashion and we're willing to do it.

LIU: I don't know if they've ever said a la carte we'll never, never do it, but they're always said that it doesn't make economical sense. It's not going to be good for the consumer if we go to a la carte pricing.

KANOJIA: Well, I tend to have a dis -- you know, a slightly different view of that. And I think, again, I'm purely driven by, you know, whatever happens in the market, right. If you think it's bad for the consumer, well, I think the consumer should get to decide what's bad for the consumer. And I think companies have a responsibility to put -- at least I think of it this way -- put your best product out there and charge the best price you possibly can for it.

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And if somebody is willing to pay for it, great. If somebody is not willing to pay for it, they're going to find another way to do it.

(END VIDEOTAPE)

LIU: Well, that was again Aereo CEO and founder Chet Kanojia and we're going to have much more of that exclusive interview in just a few moments where he reveals who might still by the company.

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(BREAK)

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LIU: Welcome back. Let's get back to our exclusive interview with Aereo founder and CEO, Chet Kanojia. As we mentioned, the Barry Diller backed startup sought bankruptcy protection last week. In his first extensive exclusive interview since the Supreme Court decision essentially buried the company, Chet reveals exactly what will happen to Aereo and who might still by the company.

(BEGIN VIDEOTAPE)

KANOJIA: After the Supreme Court decision, which, you know, effectively put us in a very strange situation, because the court used this analogy that said you kind of look like cable, but we're not really a cable company and, you know, there was -- there was sort of a lot of confusion and regulatory uncertainty.

So we took a while the kind of figure out and see -- worked down all the decision trees. There was a lot of interest in, and still is, in buying the company and buying the assets of the company, a lot of the technology we built in particular, the net for DVR, a very expansive transcoding fabric...

LIU: Right.

KANOJIA: -- which is pretty valuable stuff. And so there was a lot of interest and, you know, really premium quality people, buyers that want to do things...

LIU: Selling the technology ?

KANOJIA: Correct.

LIU: OK.

KANOJIA: But as we analyzed all of the various paths, it was clear that we had to deal with the litigation in some

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way, shape or form, because, clearly, it was a scorched earth sort of strategy. There was no rationale behind it. And so it made sense to look at Chapter 11 as kind of a way to deal with the litigation issues and at least unencumber the assets, which are truly valuable, and take care of our shareholders...

LIU: So the assets and the liability costs...

KANOJIA: Right.

LIU: -- the legal costs. Then so walk me through how Chapter 11 is going to work then.

KANOJIA: Well, I don't -- this is my first time and hopefully my last time, too.

(LAUGHTER)

KANOJIA: I mean it's intellectually really interesting, but hopefully my last time.

LIU: Yes.

KANOJIA: My understanding is that, you know, it's a very transparent process in front of the court where people that are interested in buying the assets of the company come forth and put bids in and are able to buy the assets for good use, you know, whether they want to use it for online video or mobile video or cable TV systems or whatever that happens to be.

LIU: OK.

KANOJIA: And are able to do that without the litigation stopping them...

LIU: Without worrying about -- yes.

KANOJIA: -- or other forms of liability being tacked on and things like that. I think that the only sort of disappointing part is the team isn't together, which, you know, depends on, I guess, whoever ends up acquiring the assets or in the odd chance, the small odd chance that we end up deciding to restructure the company and attracting new capital.

LIU: What's the possibility of that?

KANOJIA: I think it's on the low end, but given the...

LIU: Less than 5 percent?

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KANOJIA: I wouldn't know. But I think given the interest in buying the assets in companies, I suspect that that's probably a more natural course and I think, financially, probably a more rewarding course for shareholders and other creditors, which is the primary responsibility that we have at this point.

LIU: Chet, who has expressed interest in these assets?

KANOJIA: We're under NDA. So, but they range, you know, all -- you know, a few Fortune 500 companies, a large Internet (INAUDIBLE), you know, people that provide video today. So a diverse set of people who all really looked at what we had built and realized that, you know, the key thing that Aereo had done was because the online world is so sensitive to costs and the outputs (ph) are obviously very low even if you're looking at \$10 products versus hundreds of dollars of products on a monthly basis.

What Aereo had really done very well was reduce the implementation costs and built a really high density solution. And that's pretty attractive to a lot of people. As everybody is looking at the broader market and saying video is getting disaggregated, you know, on an individualized basis, output (ph) is going to drop across the board, not immediately, but the foundation is now being set. So the technologies we'd built, the IT we had built was...

LIU: You're just going to be able to lower costs for...

KANOJIA: Exactly.

LIU: -- for companies.

KANOJIA: Right.

LIU: How much would those assets that you are talking about, the technology behind Aereo. I mean how much would it be worth or have you, you know, what's the value of that?

KANOJIA: I think that's purely a function of, you know, as an old mentor of mine taught me, companies aren't sold, they're bought. And it all is a function of...

LIU: Whoever -- whoever is willing to buy?

KANOJIA: And how many people, right? Competitive processes tend to drive premiums and I suspect that's going to be the case here, so.

(END VIDEOTAPE)

LIU: Again, that was Aereo CEO and founder Chet Kanojia speaking with me exclusively about filing for Chapter 11 and any final hopes for the company. In the next hour, we're going to have more of my interview with him, including his take on the streaming industry and where the cable industry is headed.

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\*\*\*END OF TRANSCRIPT\*\*\*

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CHET KANOJIA, CEO & FOUNDER, AEREO, IS INTERVIEWED ON BLOOMBERG TV

NOVEMBER 25, 2014

SPEAKERS: CHET KANOJIA, CEO & FOUNDER, AEREO

BETTY LIU, BLOOMBERG NEWS

[\*] BETTY LIU, BLOOMBERG NEWS: All right, Chet, great to see you.

CHET KANOJIA, CEO & FOUNDER, AEREO: Thank you.

LIU: It's been a while, since the summer. A lot has changed.

KANOJIA: I think it was the spring.

LIU: Well, spring, you're right. Right, the decision came down in June.

KANOJIA: Right.

LIU: How are you feeling?

Aereo CEO & Founder Chet Kanojia Intvd on Blmbg TV Analyst Wire November 25, 2014 Tuesday

KANOJIA: I'm all right. I feel pretty good. Yes.

LIU: Yes?

Are you sad?

KANOJIA: Yes, I'm disappointed, you know, and a lot of it is probably related to there's a great group of people, a great group of investors. We had, you know, both really interesting things. We had a great time. People loved it.

So, yes, we're putting all that behind us. But it's hard.

LIU: It's tough.

KANOJIA: But, you know, it is what it is, it's part of the game.

LIU: Walk me through the decision, finally, on Friday to declare Chapter 11.

KANOJIA: So we, after the Supreme Court decision, which, you know, effectively put us in a very strange situation, because the court used this analogy that -- that you kind of look like cable, but we're not really a cable company and -- and, you know, there was -- there was sort of a lot of confusion and regulatory uncertainty.

So we took a while the kind of figure out and see -- worked down all the decision trees. There was a lot of interest in -- and still is -- in buying the company and buying the assets of the company, a lot of the technology that we built in particular, the net for DVR, a very expansive transcoding fabric...

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LIU: Yes.

KANOJIA: -- if you're looking at \$10 products versus hundreds of dollars of products on a monthly basis.

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LIU: Whoever -- whoever is willing to buy?

KANOJIA: Have how many people, right, competitive processes tend to drive premiums and -- and I suspect that's going to be the case here, so.

LIU: What about your investors?

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I mean ultimately, what do they walk away with?

And I'm not just talking Barry Diller, but all of your investors, Firstmark and other VC investors, what do they walk away with here?

KANOJIA: Unknown at the moment. It depends on what the assets yield and - - and there's a question to cover liabilities and -- and if there's anything remaining, then I'll be -- obviously, everybody would participate as -- as shareholders.

You know, I think they all came into this with eyes wide open, as did we all. On a promise that the goal here was to try to force change and create something very meaningful or die trying. And I think a -- they walked away with a great set of experiences. They were part of something that was truly rewarding in terms of the kind of products that got built.

LIU: And they all knew this was going to happen.

KANOJIA: And there was a known risk. And this wasn't the, you know, I mean, obviously, the company had been sued the first, you know, the -- the moment we announced our existence to the outside world in terms of how to deal with this at all.

LIU: Right. From day one, three years ago.

KANOJIA: Right. So this wasn't a surprise. Obviously, a lot of people invested in the company after the fact. And investments are -- they tend to be a -- especially at the venture scale, they -- you know, you win on some and you won -- lose on some.

And I think the -- the thing to walk away with is my sense, as I do, a deep sense of disappointment that a -- this is one -- this is not -- this was not the right outcome. The standards that were used to judge the company at the highest court were not correct. But, know, be that as it may, it's a hard -- the highest court in the country and you can't appeal.

So...

(LAUGHTER)

KANOJIA: The people...

LIU: There's no other recourse.

KANOJIA: There's no. Well, I mean, obviously, you can go to Congress and do all of this stuff, but...

LIU: It just wasn't worth it.

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KANOJIA: It was a long trek. And I don't think -- it's funny that a question over there (INAUDIBLE). I think our conclusion is they were inevitable. But if they are going to happen, then there will be a time and place to go at it again.

LIU: Well -- well, do you think you'd ever come back with an Aereo Version 2?

(LAUGHTER)

KANOJIA: I have no idea. I think I'm busy dealing with putting the Aereo Version 1.0 to a conclusion so.

LIU: Now, you've said before that the Supreme Court decision was, I believe, quote, "incredibly wrong," right?

I mean you -- you've said essentially that there were -- they were essentially wrong on every front.

Have you thought about, since the June decision, if there was any part of that decision that you agreed with?

Could you see at all the other side?

KANOJIA: Well, the dissent I certainly agreed with. So, you know, it's interesting, the -- it was fascinating to see the analysis that if you had existed back then, you would have been under the purview of this, the '76 Act.

The fact of the matter is we didn't exist back then. This technology didn't exist back then. To make that leap is -- is difficult for somebody who purposefully started something while recognizing that this couldn't have existed back then. The technology was just not possible or capable.

And I think a lot of it is, you know, hindsight is 20-20, but I -- I just think that there was a -- novelty is a -- is a big issue, it seems like, in the legal system. If you're new and you're different...

LIU: (INAUDIBLE).

KANOJIA: -- you must be scary. At least that's an outsider's -- obviously, I have no idea what goes on inside the Supreme Court...

LIU: You're right.

KANOJIA: -- or does -- or any court, for that matter.

And, you know, novelty scares people.

At the end of the day, I think if you take a step back and say what did this company really do, it's -- it was opening up a marketplace using complete -- you know, and -- and multiple federal courts have found that we were absolutely

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right. I think that itself, like it was a -- an incorrect decision from our perspective. And to the extent that there was discomfort from -- at least from my perspective -- and I think that they sent -- sort of said this -- to the extent there is discomfort in this prevailing, Congress is perfectly capable of fixing these things. And, in fact, the incumbents have a lot more control over the Congressional process...

LIU: Yes.

KANOJIA: They have a lot more lobbyists. They spend a lot more money. They've been around the block a few more times. And that's not (INAUDIBLE) they've done this multitudes of times. They've changed laws to accommodate for new technology. They should.

LIU: All right, Chet, hold on one second.

(OFF CAMERA REMARKS)

(AUDIO GAP)

LIU: Chet, just to take up where we left off, OK, so -- so you're saying, you know, essentially, look, the Supreme Court might have been more hostile to Aereo because it's a new form of technology, it's a new thing. You're a disrupter, right.

But on the content side, though, I'm still curious, on the content side, can you understand, though, how the Les Moonveses of the world, right, and the Bob Igers and -- and the other content creators believe that they won based on -- that they were justified in winning, that they own that content so they ought to be able to distribute it however they want?

KANOJIA: They certainly have the right to distribute it however they want. And -- and don't get me wrong. And -- and I think the, you know, it's probably appropriate to be very clear, you know, that obviously Aereo has a perspective on this because we had an ax to grind. I understand that.

And the court probably wisely, incorrectly, however you look at it, took their view and it is what it is.

You know, the Aereo technology was not intended for any old content. It was only very specifically to broadcast TV, which was free to air. So the argument we used -- obviously that didn't succeed -- was, you know, the consumer has the right to an antenna. It doesn't always matter whether this antenna -- antenna is located on my roof or on my handheld or it's a central antenna that I'm leasing. The specific technological implementation is irrelevant, those are. And then, of course, that was actually -- we have -- how you do it doesn't really matter.

If it looks like cable TV to a company, we must treat you as such.

LIU: Right.

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KANOJIA: (INAUDIBLE)

LIU: And you must pay for that content.

KANOJIA: But that's actually where it's even harder to understand the law as it's sort of -- the compulsory license, which is what, under copyright law, you're required to pay, we were happy to pay and we actually had filed all our filings and things like that.

The challenge was the market is involved -- involved in the early '90s and mid-'90s to just permit copyright of this payment to a retransmission payment, which isn't copyright law, by the way, and we were sued under copyright law.

So there was this mishmash of competing regimes that sort of came together. And -- and, you know, I think it's pretty obvious that the day we started, we built everything to comply to the tee with the law as it existed back then. And if there was a mechanism in which there was a framework that said this is how an online provider is supposed to operate, we would have done that. It didn't exist.

LIU: It didn't exist.

KANOJIA: And so we had to create that argument, that question and that opening. And, you know, we took the approach we took because we thought it made the most sense to drive the conversation forward.

LIU: You know, you've been immersed in this world for three years, right.

Should content be free?

Should it actually just be free?

KANOJIA: I -- you know, I believe in markets. I -- I firmly do. And I think if a content provider wants to charge \$100 a month for that, they have every right to charge \$100 a month. If they want to provide it for free, they have every right to provide it for free.

If you are a broadcaster that's broadcasting free to air, to a consumer with an antenna, you can't take both sides of the argument. That's the -- the -- that's really the -- if those companies weren't broadcasting -- we didn't do this with HBO or Turner or any of those, right?

So -- so it was very specifically free to air broadcast television. It had nothing to do with, you know, since they elected (INAUDIBLE) we're not a free to air broadcaster and we would like you to pay a million dollars an hour for our content, great. If the market bears it, I think that they have every right to be able to do that.

LIU: So how do you feel about the ABCs and the CBSes of the world?

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How do you feel about them?

KANOJIA: I -- I think they're perfectly fine companies. I think we've already -- always said that when you, there's nothing -- I don't feel any good, bad or -- or -- I have no feelings. I mean we wanted to build a technology that would open up the marketplace. And that was (INAUDIBLE).

LIU: You don't feel any animosity toward them?

You don't feel like they're a bunch of fat cat media guys who are just protecting their business model?

KANOJIA: Well, they are protecting their business model, but they're obligated to. That's what their job is. I don't blame them. I mean if I...

LIU: If you were in their shoes...

KANOJIA: -- if somebody gave me that job and said, you run a large public company and your responsibility is your shareholders, that's the same set of responsibilities that apply.

I think, you know, certain companies take a more progressive view and say, OK, is the world changing in three years, so I'm going to take three or four steps and create products that will change my company. And -- and everybody has a different pace. Sometimes they get to it, sometimes they don't get to it.

LIU: But, you know, Chet, with the -- what was interesting was that since the June decision, you've seen some of these broadcasters and you've seen some of these cable companies -- content companies go out and say we're actually going to stream our content online, right?

I mean, suddenly CBS is going to be distributing their online channel. You have HBO and Showtime that are now going over the top with theirs.

And I just want to play for you -- and here -- and this portion I'm going to read it -- what Les Moonves said about CBS Online. He said, quote, "Because of the knowledge of who CBS is and the great tradition of CBS News, I think it is logical that people will start tuning into CBS Online to get all the news that they need. I think it will be eminently successful without a great deal of cost to us."

What do you think of -- what do you make of his moves?

KANOJIA: Oh, A, I think if they had done all of that before we existed, it would have saved me a lot of time and money.

(LAUGHTER)



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You know, it doesn't necessarily -- I don't think the world, you know, content is great and certain content is less (INAUDIBLE) in a must-have category, right. And I put that as -- I jokingly say, you know, from Roman times onward, people have paid for spectacles.

LIU: Yes.

KANOJIA: But there's a huge bar -- barrier between what those spectacles are to what's like good enough. The fear that I think people should have because it's played out in every other domain is good enough starts happening at a big enough scale and suddenly it starts taking over the (INAUDIBLE) practically. You know, Netflix is a fantastic example of what used to be good enough is creating premium, excellent quality stuff. And people said it would never happen and people said, you know, go back to them and...

LIU: And now they're demanding it. Right.

KANOJIA: -- but they were Albanian Army and this and that and all this other stuff. But look at where we are at today. And in, what, two or three short years.

LIU: Look at where Netflix is.

KANOJIA: Exactly.

LIU: You know, you mentioned the whole Albanian Army comment. You know, I -- I bring up Les Moonves because he, of all the media CEOs, I think, was -- was most vocal on attacking Aereo. You know, at one point on our air calling Aereo a pimple on the media landscape, outright fighting Barry Diller on this.

Was there some sort of a, you know, because you are a disrupter, Chet.

Was there some kind of a satisfaction in kind of getting under the skin of these CEOs?

KANOJIA: No, no, no, not at all. These are -- I mean I don't -- I'm not personal friends with any of these people, but, you know, from all appearance and people that I have known are in common, you know, I -- I'm told and I'm sure they're right, they're perfectly great, nice, very competent people.

I, you know, a business strategy that is contrary to what's accepted norm isn't necessarily a means to, you know, goad somebody or be under their skin. It's -- it's just straight up, you know, we think that it's a good opportunity to pursue with (INAUDIBLE) considered and -- and it -- if it were so great, if it doesn't work out, then it wasn't a good opportunity to pursue.

LIU: Have you talked to any of the media CEOs since that Supreme Court decision?

KANOJIA: I'm trying to think. Probably not, no.

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LIU: No.

KANOJIA: No.

LIU: You've talked to Barry Diller, obviously.

(LAUGHTER)

LIU: How does Barry Diller feel about this?

KANOJIA: Well, I think every conversation I've had with him -- and this is just perspective. I don't know how he feels about it. You know, it was very much, look, we're going to do our best to create something that's cool, interesting, useful to people and it's going to be what it's going to be. If it works out, great. If it doesn't work out, we at least succeeded in things that we were -- we got one under our control -- the product, identifying the right market, making sure we can position our brand and company appropriately, get growth going, build a great set of people, team, all of, you know, when you are running a start-up company, you get judged by outsiders, insiders, how are you looking at it on all these different levels.

And you can only do things that are under your control and -- which is why nine times out of a -- 10, you want to avoid things in start-ups that are not in your control. Unfortunately, in Aereo's case, that was a very foundational thing that was not under your control. And even that, we did pretty well, you know, through the Second Circuit.

LIU: Right. No, you did, up to the Supreme Court.

KANOJIA: Yes.

LIU: After -- directly after, though, the -- the verdict was, you know, the decision was...

KANOJIA: Right. Right.

LIU: -- was -- was, um, was broadcast, did you call up Barry?

Did you guys...

KANOJIA: Yes, yes, we spoke.

LIU: OK, and did you -- did you then implement, you know, a game plan or -- or how did that work?

KANOJIA: Um, you know, one of my -- I loved every interaction I had with Barry. And it was tremendously not in an explicit way, but a great mentor just by observation in terms of how do you react to certain things, how do you overreact, how do you under react.

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LIU: What did he tell you?

KANOJIA: And he said, you know, you did your best. Something good will come off of it. Something good already has come off of it. Do your best and figure out what's the right path, approach to the company is. Let me know if I can be helpful.

LIU: Did he ever consider buying any of the assets of Aereo himself?

KANOJIA: So in -- now, I don't think that's ever been a thought in any of our minds, no.

LIU: For him to come in and buy?

KANOJIA: Whenever had that conversation.

LIU: What about you?

What's next for you?

KANOJIA: You know, I have to put a -- a final dot on the chapter of Aereo. That will take a little while. And after that, you know, I'll think about what's -- you know, I have certain things that I want to pursue, think about. So I'll keep my eyes open and keep something interesting...

LIU: Another industry you might disrupt?

(LAUGHTER)

LIU: Are you looking at it at all?

KANOJIA: No (INAUDIBLE)...

LIU: Thinking about it?

KANOJIA: -- people think of this as -- I don't think people like me are motivated by trying to disrupt something. I think we are motivated by...

LIU: You're not an antagonist?

KANOJIA: -- a certain set of opportunities or user experiences, right. So if it's not easy and simple, I kind of -- you know, maybe I'm lazy. Maybe I'm -- I'm part of the generation, but I kind of want it all instant dial, right?

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LIU: Right.

KANOJIA: And whenever you have opportunities that you can take something that is not available that way but it's a product that people want and you can bring it to them, you know, that creates opportunities.

I think the, you know, my background is a lot more in traditional engineering, so I -- you know, I tend to do things...

LIU: Technology.

KANOJIA: -- that are more engineering centric. And, you know, you happen to be -- the output of that hard core engineering sort of perspective on it.

LIU: Chet, you know, you and I talked on the everything right before the case was heard...

KANOJIA: Right.

LIU: -- in front of the Supreme Court. But I'd always want -- wondered right directly after in June when that -- when that de -- well, actually, there's two things.

I directly wondered what happened the day after the case was -- was presented to the court.

KANOJIA: Right.

LIU: What was the first phone call you make?

What was the first thing you did after that -- on that day?

KANOJIA: So we -- I think we walked out then we had lunch with all our attorneys and stuff like that. And it was a nice, you know, a lot of our amici who had filed briefs on our behalf, a lot of the employees at Aereo who had made the trek down. There were a few that had slept in the lines outside and...

LIU: Oh, wow!

KANOJIA: In sleeping bags so the -- the least I could do was feed them. So we did all of that. And, you know, I just took like two or three days off to...

LIU: (INAUDIBLE).

KANOJIA: -- it was a very intense period going into it.

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LIU: Yes.

KANOJIA: It's things you don't realize that the whole process of dealing with the various governmental agencies and all the stuff leading up to the Supreme Court hearing is pretty intense.

So I was just burnt out. And...

LIU: How about the -- how about the first phone call you made after you heard the decision?

KANOJIA: The first phone call I made, I didn't -- I think Barry was the first phone call incoming. I texted my family or sent them, my wife, a quick note or texted her, something along those lines.

But then a lot of it was just internal discussions on -- just reading the decision was, you know, it takes hours. And the...

LIU: So -- so Barry called you, though?

KANOJIA: I think, yes, he did. Yes.

LIU: And what did he say?

KANOJIA: We basically, he said, look, you did your best.

LIU: You did your best. OK.

KANOJIA: Yes.

LIU: So that was the phone call.

KANOJIA: You did a great job and now go -- you do your best again in trying to figure out what the end for it, how do you navigate forward and let me know if I can be helpful.

LIU: You know, Chet, I mentioned earlier about is there an Aereo 2.0, right?

And I -- the reason why I say that is I think about Napster.

KANOJIA: Yes.

LIU: And what they did, right. They disrupted the music industry. They were accused of -- of, quote, unquote, stealing online content. They went away and then they came back, you know, in music streaming.

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So do you see parallels between yourself and Napster?

KANOJIA: No. For a few different reasons, right.

So we actually won a bunch of lawsuits because we -- all of them, with the exception of -- of the Utah one, because we carefully crafted everything to fit within the law and the big change -- difference was the Supreme Court changed the law in your case, right. They basically instructed the Circuit to change the law versus -- and I'm not terribly familiar with the exact case law in Napster's case.

I think it was a district court issue. They didn't even get to the appellate court...

LIU: No, they didn't get to the...

KANOJIA: -- that lost at the...

LIU: -- no.

KANOJIA: -- straight up thing. So I take a lot of pride in the fact that we...

LIU: Fought it to the top.

KANOJIA: Not only fought it to the top, we were right all the way to the top, right?

So we got a lot of support from all the courts going up to it, because we were right. There wasn't a -- if you looked at -- if you looked at the argument and said the technological implementation matters, then we win straight up. And I you ignore it and say technological distinctions don't matter, that's how we got labeled as a -- like a cable company.

So I think of them very different in that sense.

But I think both companies -- and -- and others in this area. If you think of them as not necessarily causing the change, but reflective of being really the bellwethers for the -- for articulating that the change is required now, because it's already happening.

LIU: Right.

KANOJIA: Then we...

LIU: Paving the way, right?

KANOJIA: Well, really being in a conversation at the forefront and then something else sort of happens. And I

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think we definitely feel like we brought the conversation to the forefront. You know, there's cord cutting forums everywhere now and -- and, you know, people are buying more antennas than they ever used to, you know, all these things that we, I think, brought that to the forefront. And -- and raised the question in the consumer's mind, you know, there are different ways to skin this cat.

So I think that's definitely -- I don't know what happens after this at this point.

LIU: Well, there are other Aereo similar to you. I mean there's Simple. TV, NimbleTV and others who purport to be very similar to Aereo. They're a little bit different in their business models, but -- but there are other, you know, Aereo, I guess, substitutes that are out there that are still fighting.

KANOJIA: Well, the oldest Aereo substitute is, you know, you take your train up and down anywhere in Manhattan and you see in Brooklyn and in Queens, you know, a bunch of satellite dishes and a bunch of over the top antennas, right?

So...

LIU: Right.

KANOJIA: -- people do this all the day long, right. And that's sort of the -- the sad part of this whole thing is we just wanted you to be able to do it easier...

LIU: Yes.

KANOJIA: -- in -- in a centralized (INAUDIBLE) location.

So, yes, those things have been going on since like, what, 1932. And I don't think they're going to go -- I mean until there is free broadcasting in this country, people are going to use...

LIU: But does it worry you that maybe somebody -- maybe you were too early -- you were too ahead of your time that somewhere down the line -- in a couple of years when -- when courts are more familiar with cases like yours, when people are more familiar with technology like yours, that there will be an Aereo-like company that will succeed, just not necessarily yours?

KANOJIA: Sorry. I think that's -- yes, I -- I think that as long as the basic idea of a simplified consumer and a rational price point works out, I'll be OK with that.

LIU: And, Chet, on a completely different note, look, you know, you have talked about being Indian-American.

KANOJIA: Yes.

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LIU: And of -- of a company, an upstart company that has obviously challenged, you know, a major industry.

You've seen President Obama and his policy on immigration and the executive orders.

How do you feel -- because many people look at you and they say you're a poster child for...

(LAUGHTER)

LIU: -- in India, they look at you and they say you're a poster child of someone...

KANOJIA: Right.

LIU: -- who comes to this country, been able to create jobs.

How do you -- what's your stance on immigration and how do you feel about -- about that?

KANOJIA: You know, I don't have a qualified opinion on this, just because I'm not -- I don't pay attention to the issues. I probably should, a little bit more.

But, you know, I have a very basic view, which is I -- some fundamentals in my life.

The American model -- education, being able to work your way into pretty much anything you want, it's purely a question of how much effort do you want to put in and if you've got the basic smarts, there are plenty of other people who are there to support you, even if they want to take advantage of you in terms of put money into you and -- and make a profit, all perfectly good things, is the best model.

I don't understand why we would create any barrier, to me, in attracting the best possible talent you possibly can to, quote, unquote, export that model or amplify that model.

The model works. It's the best model. The American model, to me is, I'm very proud of my heritage, being from India, but the opportunities that we have here, you know, the flexibility, you know, basic liberties, being able to go do something really interesting (INAUDIBLE)...

LIU: Preserve that?

KANOJIA: Not only we should just -- it should be celebrated. It should be invested in more. It should be exported. Now, not in the ways we've done it in the past, but by bringing, you know, people to this country who can help create value.

I'm sure there are particular constraints around, you know, quotas and then how do we balance joblessness versus not. But, you know, especially in the -- in a -- in my very narrow part of the world, if you will, you know, we're talking

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about very highly qualified, creative people coming into this country.

And I think there were some provisions I heard about entrepreneurship things where (INAUDIBLE)...

LIU: Yes, exactly.

KANOJIA: But a...

LIU: Extending those...

(CROSSTALK)

KANOJIA: And I think there was also something around the idea that a student would have extra time getting off an F1 Visa to go, get an H1-B, find a job. So I think those are all, you know, good steps.

LIU: Did you find, though, that you were having -- having a hard time getting workers, high skilled workers, particularly foreign workers, when you were building up your company?

KANOJIA: You know, I suspect that companies of our scale, you know, 100 to 200 people, that's less of an issue.

LIU: OK.

KANOJIA: Because start-up teams tend to be around proven talent or very, very unproven low cost, but highly promising talent. And that's -- so you kind of blend those and -- but when you are trying to just get, you know, 1,000 qualified IT workers, I'm sure the problem set is very different ones.

We didn't necessarily experience that, but I've gone through, personally, the H1-B process and all that...

LIU: You have?

KANOJIA: -- myself. Yes.

LIU: Was it a nightmare?

KANOJIA: Again, you know, I -- maybe I'm just lucky. I sort of stumbled through things. No, I had a nice lawyer. He fixed everything up. And I had a great company who had sponsored me as a start. And it was simple.

LIU: It worked out.

KANOJIA: Yes, but there were -- there are quotas. I think there's a -- there was a limit that I couldn't apply for a

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certain time that, you know...

LIU: All right, Chet, thank you so much.

KANOJIA: My pleasure.

LIU: All right.

\*\*\*END OF TRANSCRIPT\*\*\*

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## ***Exhibit B***

(12) **United States Patent**  
**Kanojia et al.**

(10) **Patent No.:** **US 8,787,975 B2**  
(45) **Date of Patent:** **Jul. 22, 2014**

(54) **ANTENNA SYSTEM WITH INDIVIDUALLY ADDRESSABLE ELEMENTS IN DENSE ARRAY**

*H04H 60/51* (2008.01)  
*H04N 21/233* (2011.01)  
*H04H 60/70* (2008.01)

(75) Inventors: **Chaitanya Kanojia**, Newton, MA (US);  
**Joseph Thaddeus Lipowski**, Norwell, MA (US)

(52) **U.S. Cl.**  
CPC ..... *H04N 21/6112* (2013.01); *H04N 21/2181* (2013.01); *H04N 21/41407* (2013.01); *H04H 20/57* (2013.01); *H04N 21/2143* (2013.01); *H04N 21/43637* (2013.01); *H04N 21/2393* (2013.01); *H04N 21/2747* (2013.01); *H04N 21/4341* (2013.01); *H04N 21/25841* (2013.01); *H04H 60/51* (2013.01); *H04N 21/4347* (2013.01); *H04N 21/2335* (2013.01); *H04N 21/6175* (2013.01); *H04H 60/70* (2013.01); *H04H 60/82* (2013.01); *H04N 21/2221* (2013.01); *H04N 21/4126* (2013.01)  
USPC ..... **455/562.1**; 455/524; 455/525; 455/560; 455/412.1

(73) Assignee: **Aereo, Inc.**, New York, NY (US)

(\*) Notice: Subject to any disclaimer, the term of this patent is extended or adjusted under 35 U.S.C. 154(b) by 254 days.

(21) Appl. No.: **13/299,194**

(22) Filed: **Nov. 17, 2011**

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(58) **Field of Classification Search**  
CPC ..... H01Q 21/06  
USPC ..... 455/562.1  
See application file for complete search history.

**Related U.S. Application Data**

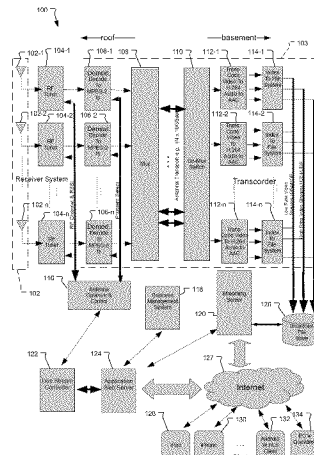
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Primary Examiner — Tilahun B Gesesse  
(74) Attorney, Agent, or Firm — Houston & Associates, LLP

(57) ABSTRACT

A method and system for capturing, storing, and streaming over the air broadcasts based on user requests is disclosed. The system and method utilize subarrays of antenna elements for receiving over the air broadcasts. Processing pipelines are used to demodulate, transcode and index the content transmissions to produce content data that are streamed to users. In this way, the feeds from antennas can be accessed by users over a network connection.

18 Claims, 13 Drawing Sheets

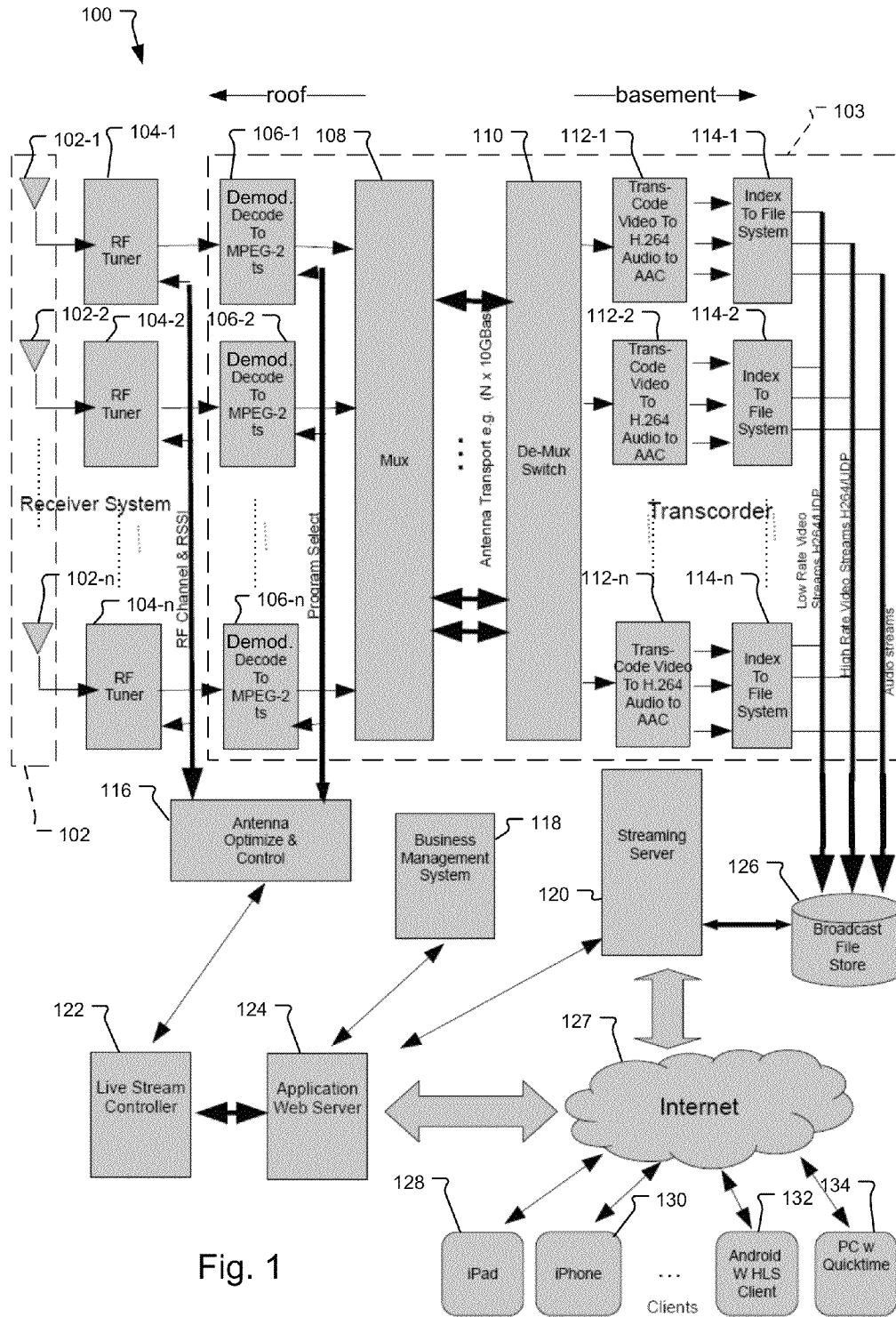


Fig. 1

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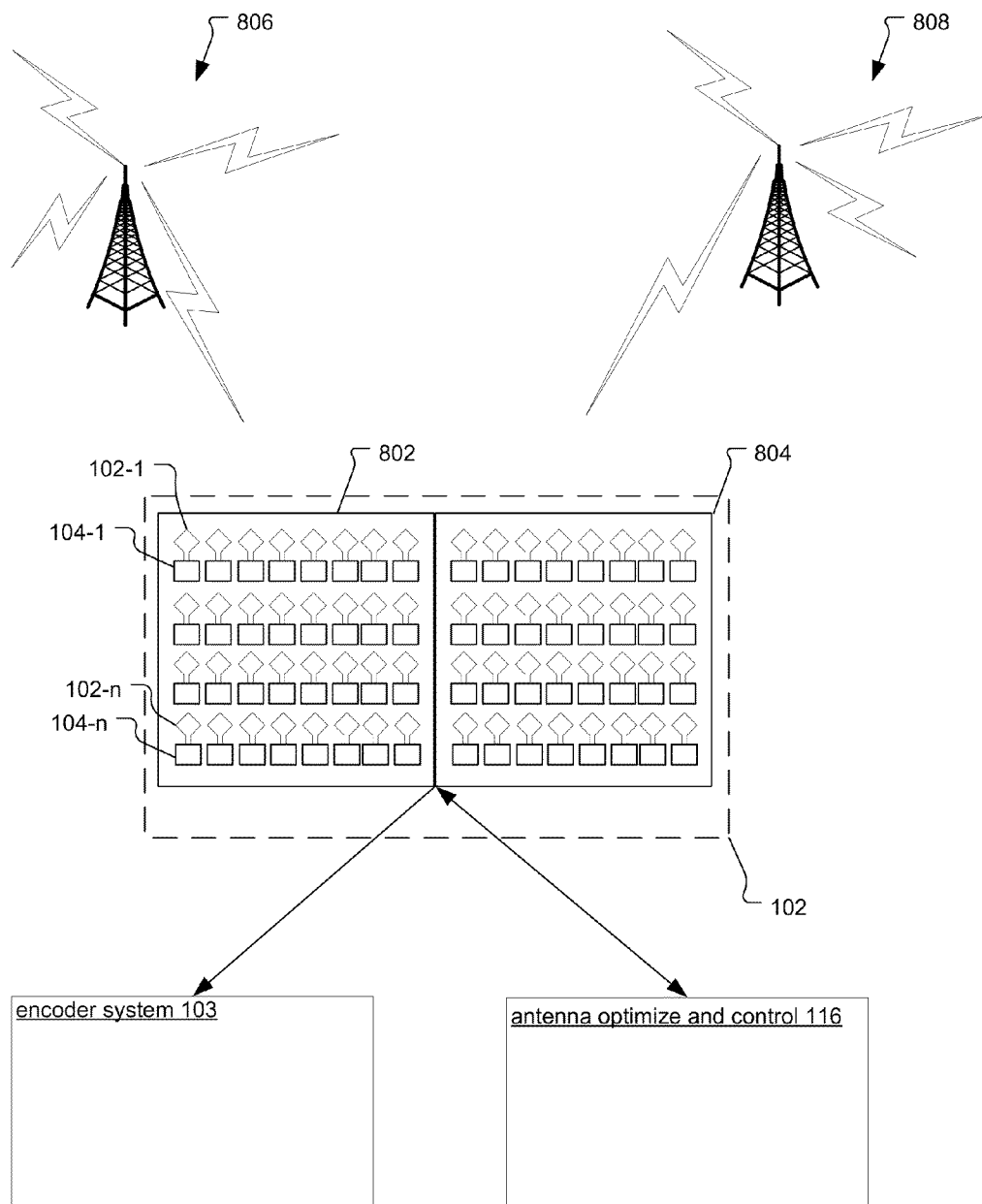


Fig. 2

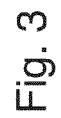


Fig. 3

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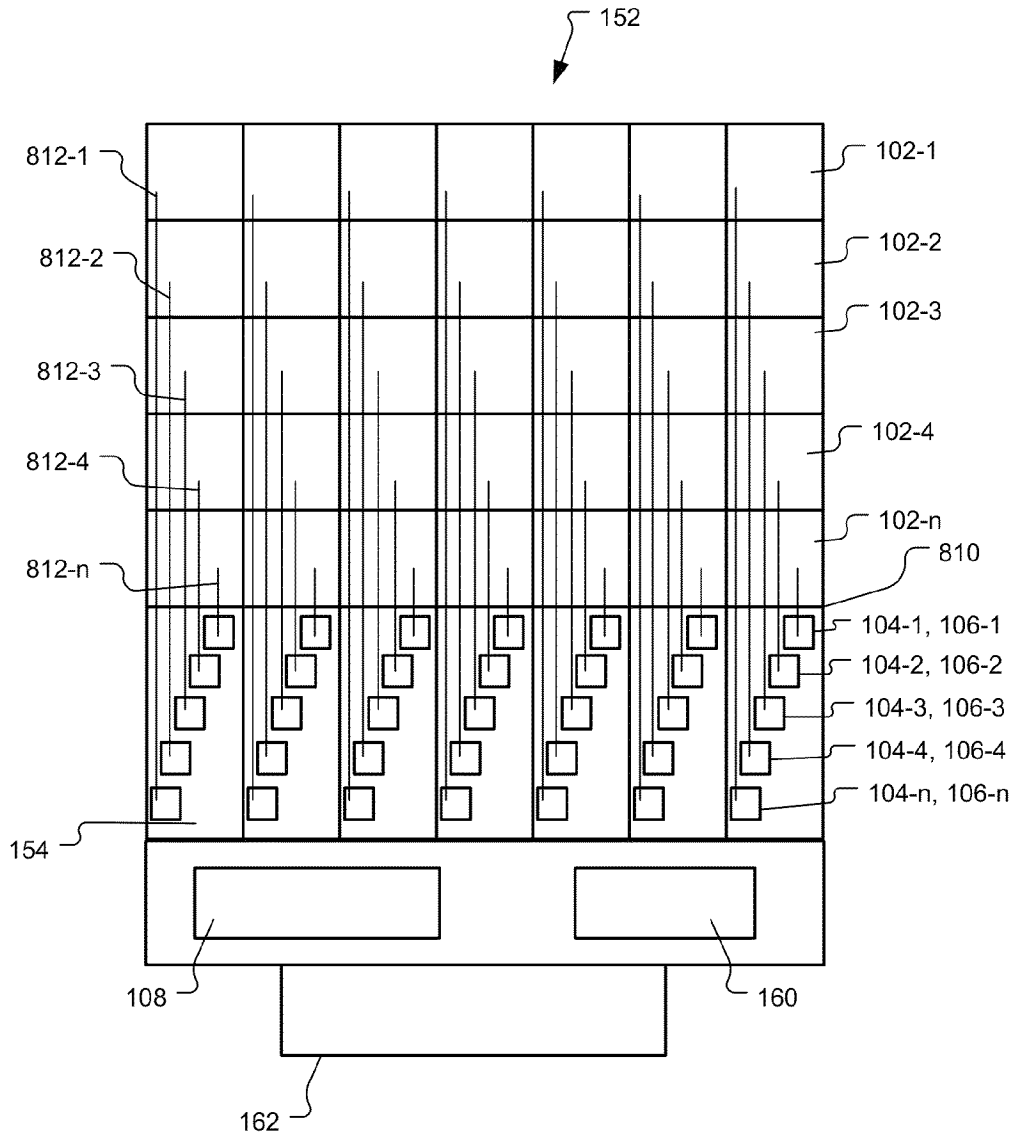


Fig. 4



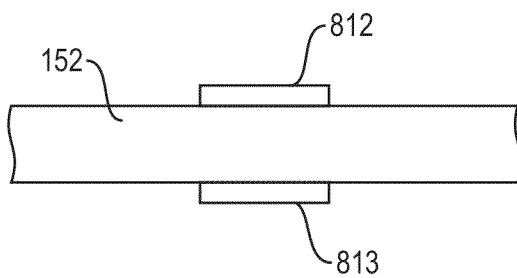


Fig. 6A

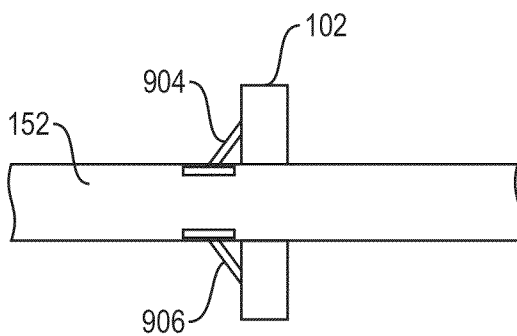


Fig. 6B

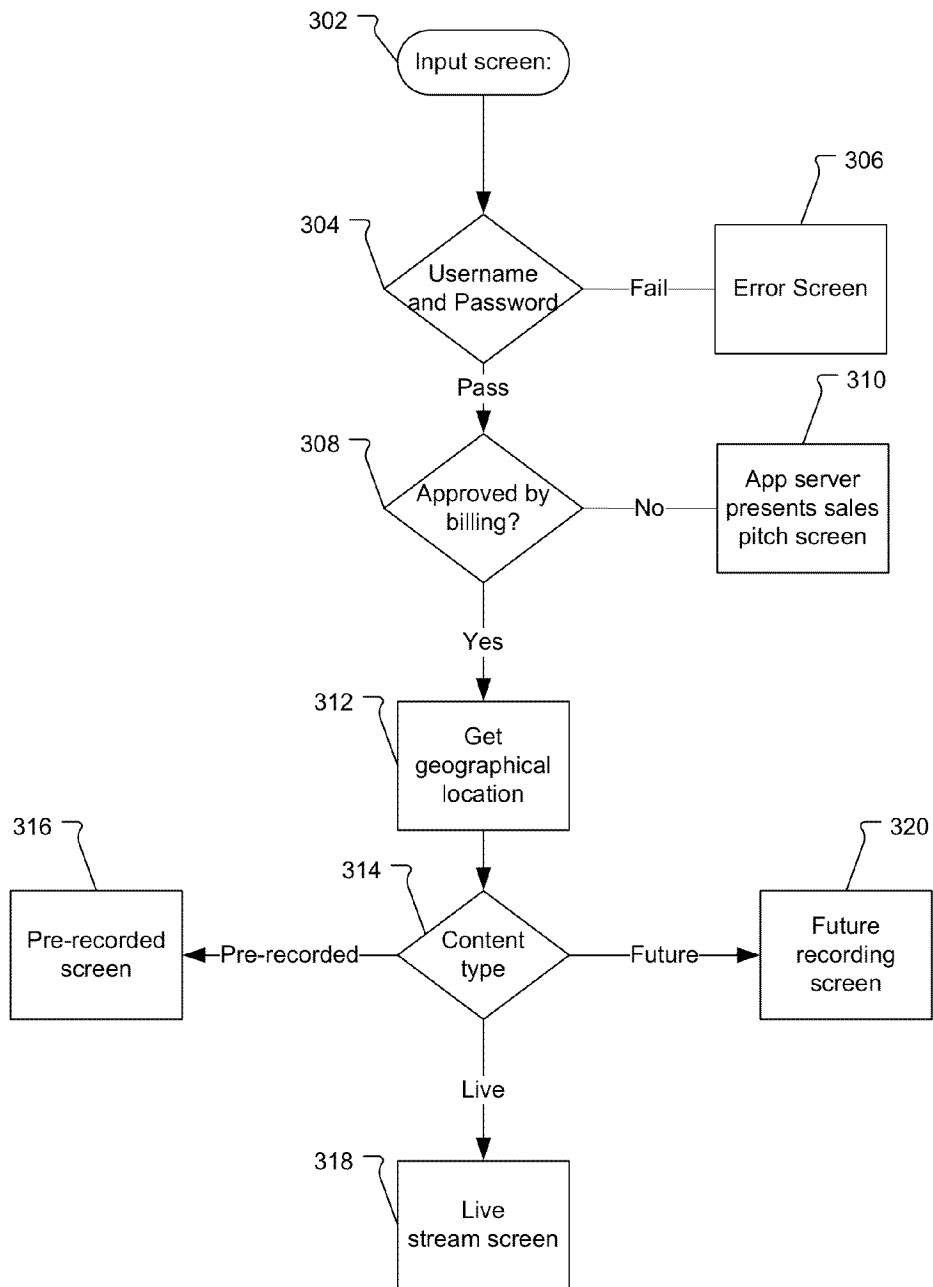


Fig. 7

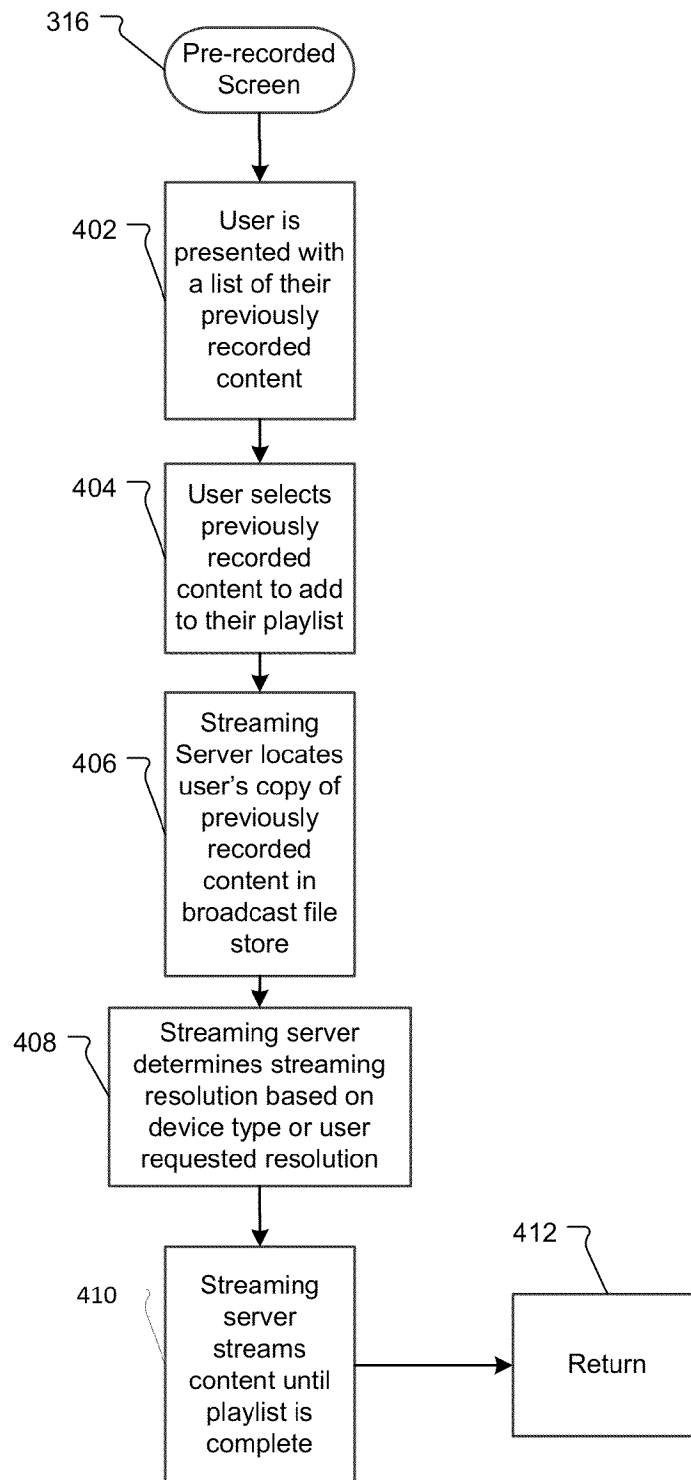


Fig. 8

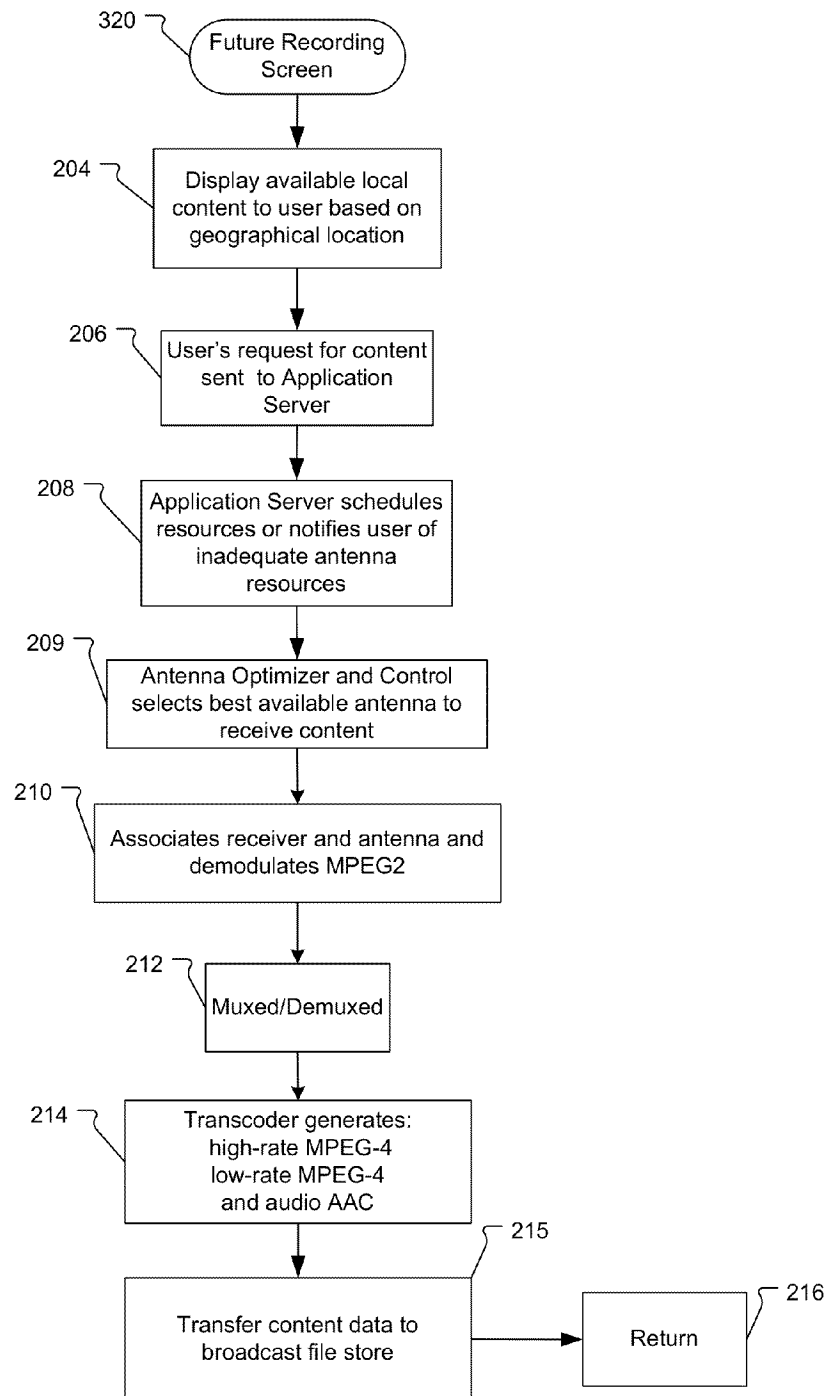


Fig. 9

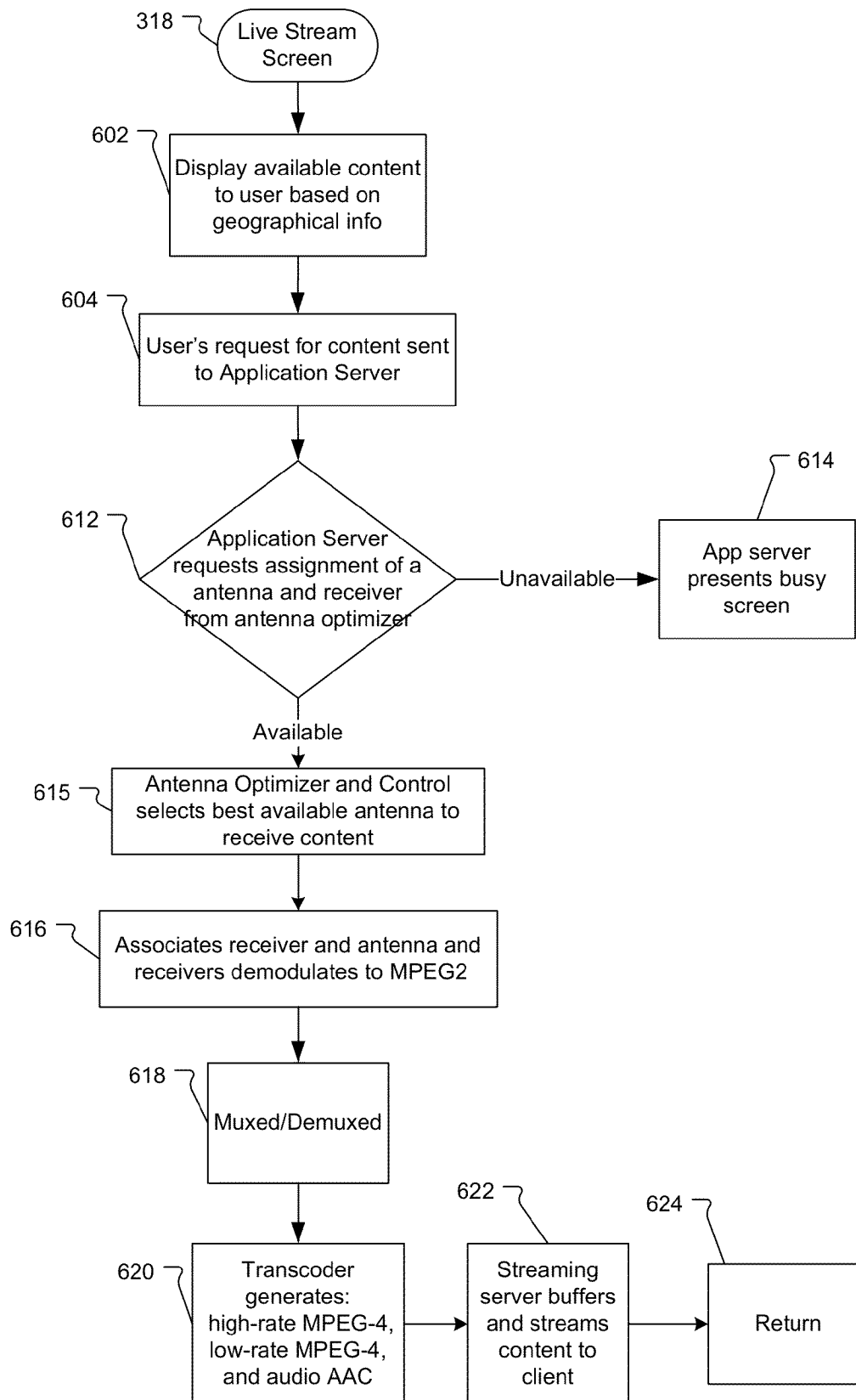


Fig. 10

USER ID	CONTENT ID	ANTENNA ID	NETWORK ID	VIDEO FILE	FILE ID	TIME / DATE
User 1	Law and Order	Antenna 1	NBC	File pointer	Episode123	10am / 10-22-10
User 2	Law and Order	Antenna 2	NBC	File pointer	Episode123	10am / 10-22-10
User 3	Survivor	Antenna n	CBS	File pointer	Episode456	3pm / 12-15-10
...	...	...	...	...	...	...
...	...	...	...	...	...	...
User - n	Law and Order	Antenna 45	NBC	File pointer	Episode123	10am / 10-22-10

Fig. 11

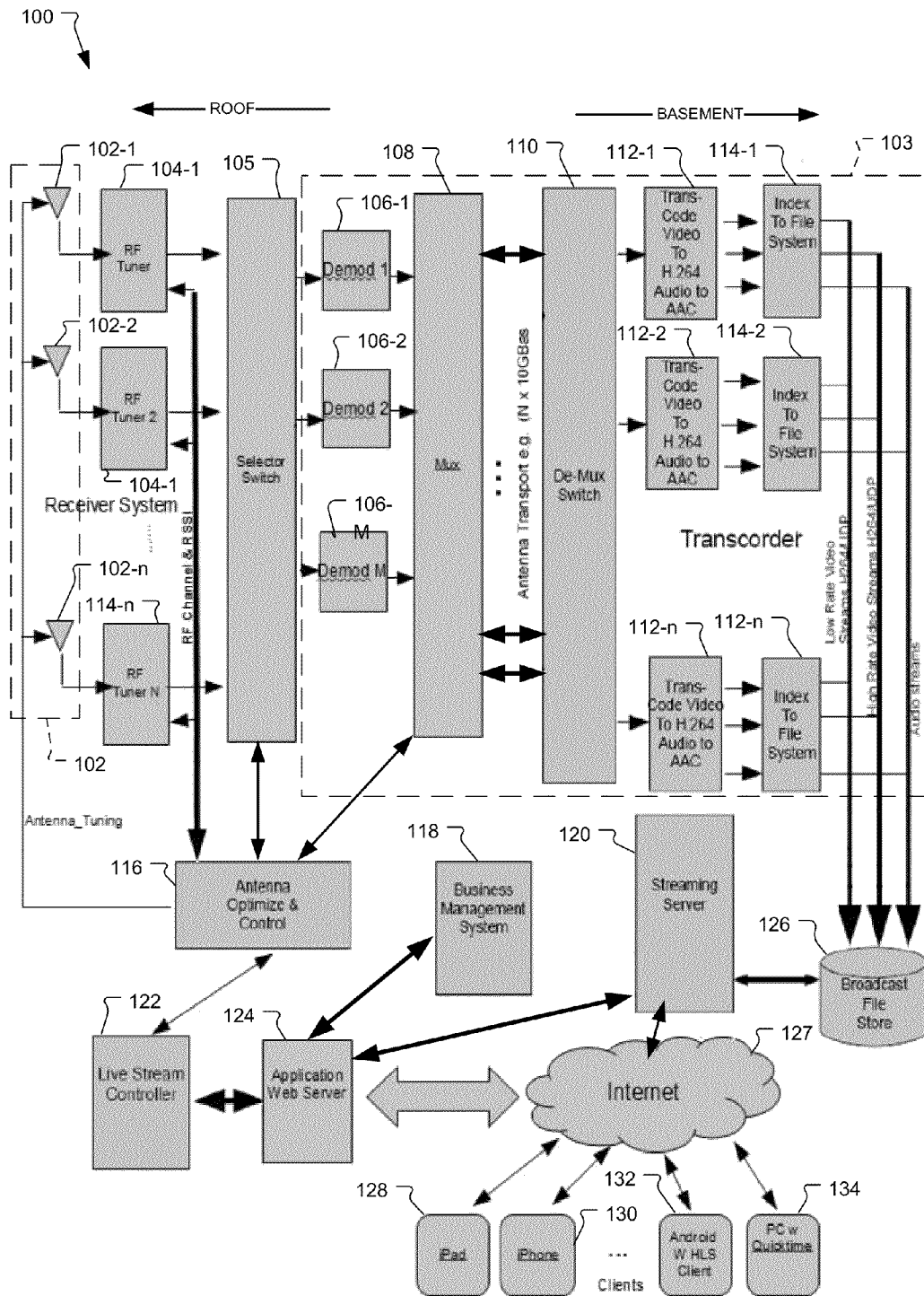


Fig. 12

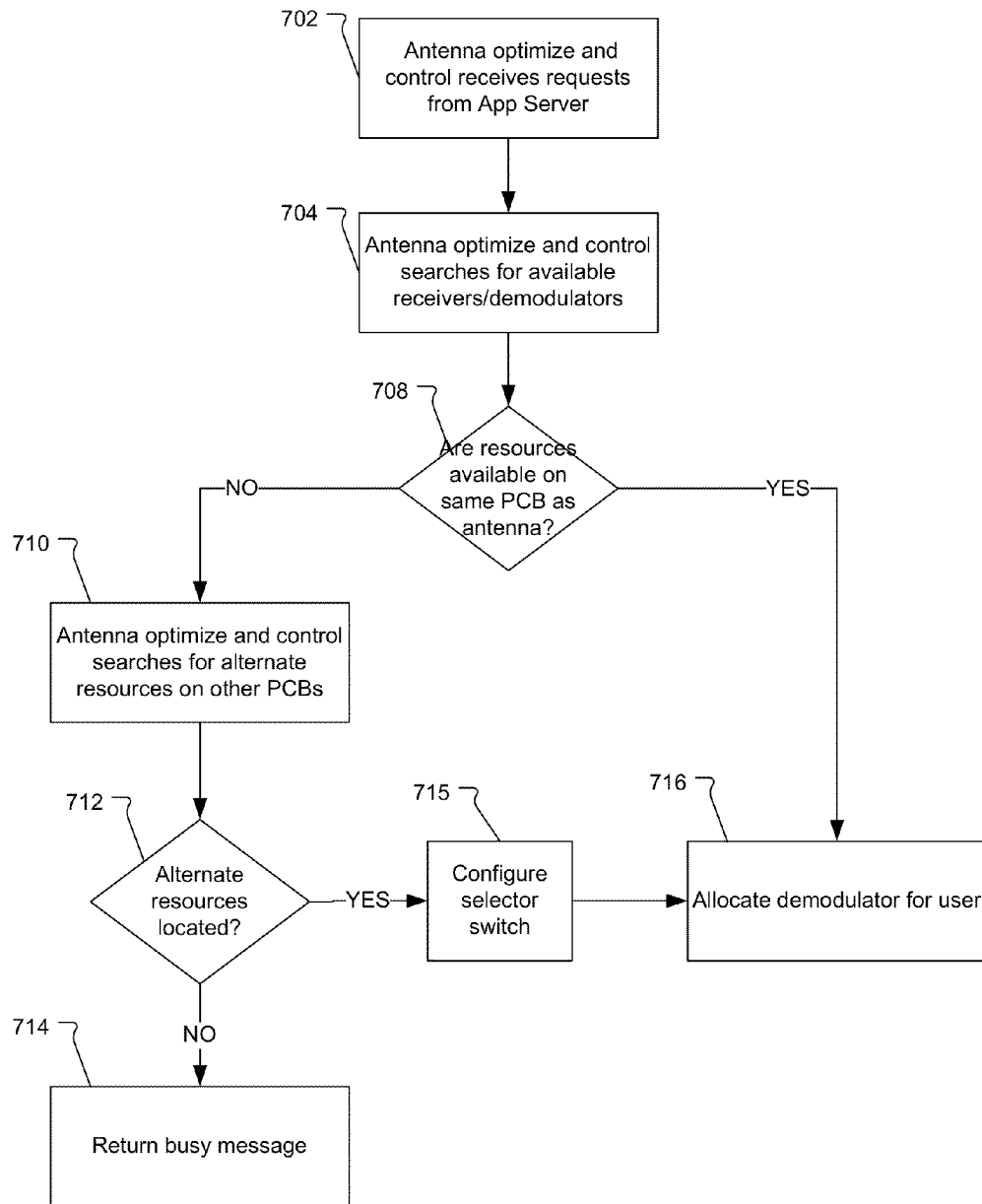


Fig. 13

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**ANTENNA SYSTEM WITH INDIVIDUALLY  
ADDRESSABLE ELEMENTS IN DENSE  
ARRAY**

**RELATED APPLICATIONS**

This application claims the benefit under 35 USC 119(e) of U.S. Provisional Application No. 61/415,012, filed on Nov. 18, 2010, U.S. Provisional Application No. 61/422,950, filed on Dec. 14, 2010, and U.S. Provisional Application No. 61/533,946, filed on Sep. 13, 2011, all of which are incorporated herein by reference in their entirety.

This application is related to U.S. application Ser. No. 13/299,186 filed on Nov. 17, 2011, now U.S. Patent Publication No. US 2012/0127374 A1, U.S. application Ser. No. 13/299,191 filed on Nov. 17, 2011, now U.S. Patent Publication No. US 2012/0131621 A1, and U.S. application Ser. No. 13/299,198 filed on Nov. 17, 2011, now U.S. Patent Publication No. US 2012/0129479 A1, all of which are incorporated herein by reference in their entirety.

**BACKGROUND OF THE INVENTION**

Over the air television, which is also referred to as terrestrial television or broadcast television, is a distribution mode for television content via radio frequency (RF) electromagnetic waves or radiation through the atmosphere. Some examples of well known television networks in the United States that broadcast over the air content are ABC, CBS, FOX, NBC, and PBS. Through a series of affiliate stations, these networks are able to blanket the country with broadcasted content. The result is that each one of these television networks is able to reach over 95% of all the households in the United States.

Television networks are always looking for ways to attract new customers and increase viewership. Recently, some television networks have been putting their programming online for people to access via private and public data networks such as the Internet. Typically, the television networks will upload content to their website or some other third party website, such as HULU.COM, that stream the content to users, sometimes for a fee. Today, the content that is available is often limited; sometimes, the most recent episodes are not available or the content is outdated.

At the same time, a wide variety of devices are available that can play audio and video content. In addition to the ubiquitous television, many now watch video on their personal computers and mobile computing devices, such as smartphones and tablet computers. Video content is usually accessed through the Internet using subscriber data networks, cellular phone networks, and public and private wireless data networks. Moreover, some televisions now have network connections. And, many game consoles have the ability to access video content using third-party software such as provided by Netflix, Inc.

**SUMMARY OF THE INVENTION**

Despite all of the new modalities for viewing video, over the air content broadcast by the traditional television networks is still generally only available through cable television subscriptions, satellite television systems, or by capturing the over the air broadcasts with a home-installed antenna. For users that do not subscribe to cable or do not have cable access, it is generally required that they install their own RF or satellite antenna in order to capture this broadcast content. Then, this captured content is generally only available for

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display on a traditional television. There is generally no simple way for a user to have this content available to their other video-capable devices.

The present system and method concern an approach to enabling users to separately access individual antenna feeds over a network connection, such as the Internet and/or service provider network. Each user is assigned an antenna, such as their own, separate, individual antenna, from which they can then record and/or stream content transmissions from over the air broadcasts. That assignment may happen either as the user initiates a recording or a user may be exclusively assigned a specific antenna for their sole use for any and all of their viewing and recordings. As users select content transmissions, individual antennas receive the broadcast content. At the users' election, the system stores the content data to each of the users' individual accounts separately for later playback by that user and/or streams the content data to the separate users. In this way, the users can access broadcast content without having to maintain their own antenna infrastructure and access broadcast content on devices, such as mobile device, that lack the tuners and decoders necessary to directly access over the air broadcasts.

The antenna assignment is either permanent or temporary depending on the mode of operation. In one mode, when users select to receive over the air content or record over the air content for later viewing, corresponding antenna elements and encoding resources are allocated to the users on the fly. Then, after the antenna elements are no longer needed, the resources are returned to the resource pool and become available for other users. In the other mode, users lease or buy particular antenna elements, which are then exclusively assigned to particular users and then used to service the requests of those users. In one example, the antenna elements are leased to users for the duration of those users' accounts.

Important to making the system feasible is creating a physically compact antenna system.

In general, according to one aspect, the invention features an antenna system comprising a two dimensional array of antenna elements for separately receiving over the air broadcasts, the array of antenna elements having a density of at least 10 antenna elements per square meter and an encoder system for converting over air broadcasts received by the separate antenna elements into content data to be stored in a data storage system.

In embodiments, the antenna elements are omni-directional antenna elements and particularly the antenna elements are symmetric dual loop antenna elements.

Further, multiple ones of the two dimensional array of antenna elements are preferably used along with a housing that supports the two dimensional arrays adjacent to each other. Thus, the two dimensional arrays of antenna elements form a three dimensional array within the housing.

In a current example, the two dimensional array of antenna elements and at least part of the encoder system are implemented on a common circuit board. The encoder system comprises demodulators that are implemented on the circuit board. Radio frequency tuners are used for tuning the antenna elements of the two dimensional array. The two dimensional array of antenna elements and radio frequency tuners can be implemented on a common circuit board.

For density, the circuit board preferably comprises at least 50 antenna elements, with the antenna elements have a density of at least 50 antenna elements per square meter.

In general, according to another aspect, the invention features a method for receiving over the air broadcasts with an array of antenna elements. The method further including providing a two dimensional array of antennas elements for

The above and other features of the invention including various novel details of construction and combinations of parts, and other advantages, will now be more particularly described with reference to the accompanying drawings and pointed out in the claims. It will be understood that the particular method and device embodying the invention are shown by way of illustration and not as a limitation of the invention. The principles and features of this invention may be employed in various and numerous embodiments without departing from the scope of the invention.

FIG. 13 is a flow diagram illustrating how the application web server and antenna optimize and control search for resources located on other printed circuit boards.

FIG. 1 shows a system 100 that enables individual users to receive terrestrial television content from antennas via a

The broadcast capture portion of the system **100** includes  
 65 an array **102** of antenna elements **102-1, 102-2 . . . 102-n**.  
 Each of these elements **102-1, 102-2 . . . 102-n** is a separate  
 antenna that is capable of capturing different terrestrial tele-

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vision content broadcasts and, through a digitization and encoding pipeline, separately process those broadcasts for storage and/or live streaming to the user devices. This configuration allows the simultaneous recording of over the air broadcasts from different broadcasting entities for each of the users. In the illustrated example, only one array of antenna elements is shown. In a typical implementation, however, multiple arrays are used, and in some examples, the arrays are organized into groups.

In more detail, the antenna optimization and control 116 determines which antenna elements 102-1 to 102-n within the antenna array 102 are available and optimized to receive the particular over the air broadcasts requested by the users. In some examples, this is accomplished by comparing RSSI (received signal strength indicator) values of different antenna elements. RSSI is a measurement of the power of a received or incoming radio frequency signal. Thus, the higher the RSSI value, the stronger the received signal.

After locating an optimized antenna element, the antenna optimize and control 116 allocates the antenna element to the user. The antenna optimization and control system 116 then signals the corresponding RF tuner 104-1 to 104-n to tune the allocated antenna element to receive the broadcast.

The received broadcasts from each of the antenna elements 102-1 to 102-n and their associated tuners 104-1 to 104-n are transmitted in parallel to an encoding system 103 as content transmissions. The encoding system 103 is comprised of encoding components that create parallel processing pipelines for each allocated antenna 102-1 to 102-n and tuner 104-1 to 104-n pair.

The encoding system demodulates and decodes the separate content transmissions from the antennas 102 and tuners 104 into MPEG-2 format using an array of ATSC (Advanced Television Systems Committee) decoders 106-1-106-n assigned to each of the processing pipelines. In a situation where each broadcast carrier signal contains multiple content transmissions, the antenna optimization and control system 116 signals the ATSC decoders (or demodulators) 106-1 to 106-n to select the desired program contained on the carrier signal. The content transmissions are decoded to MPEG-2 content transmission data because it is currently a standard format for the coding of moving pictures and associated audio information.

The content transmission data from the ATSC decoders 106-1 to 106-n is sent to a multiplexer 108. The content transmissions are then transmitted across an antenna transport interconnect to a demultiplexer switch 110. In a preferred embodiment, the antenna transport interconnect is an nx10GbE optical data transport layer.

In the current implementation, the antenna array 102, tuners 104-1 to 104-n, demodulators 106-1 to 106-n, and multiplexer 108 are located outside in an enclosure such as on the roof of a building or on an antenna tower. These components can be made to be relatively robust against temperature cycling that would be associated with such an installation. Also, these components are relatively inexpensive so that loss can be minimized in the event of damage sustained as the result of electrical discharge or vandalism.

The multiplexer 108, demultiplexer switch 110, and nx10GbE data transport are used to transmit the captured content transmission data to the remainder of the system that is preferably located in a secure location such as a ground-level or the basement of the building, which also usually has a better control over the ambient environment.

The content transmission data of each of the antenna processing pipelines are then transcoded into a format that is more efficient for storage and streaming. In the current imple-

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mentation, the transcode to the MPEG-4 (also known as H.264) format is affected by an array of transcoders 112-1, 112-2 . . . 112-n. Typically, multiple transcoding threads run on a single signal processing core, FPGA or ASIC type device.

The content transmission data are transcoded to MPEG-4 format to reduce the bitrates and the sizes of the data footprints. As a consequence, the conversion of the content transmission data to MPEG-4 encoding will reduce the picture quality or resolution of the content, but this reduction is generally not enough to be noticeable for the average user on a typical reduced resolution video display device. The reduced size of the content transmissions will make the content transmissions easier to store, transfer, and stream to the user devices. Similarly, audio is transcoded to AAC in the current embodiment, which is known to be highly efficient.

In one embodiment, the transcoded content transmission data are sent to a packetizers and indexers 114-1, 114-2 . . . 114-n of the pipelines, which packetize the data. In the current embodiment, the packet protocol is UDP (user datagram protocol), which is a stateless, streaming protocol. UDP is a simple transmission model that provides less reliable service because datagrams may arrive out of order, duplicated, and go missing. Generally, this protocol is preferred for time-sensitive transmission, such as streaming files, where missing or duplicated packets can be dropped and there is no need to wait for delayed packets.

Also, in this process, time index information is added to the content transmissions. The content data are then transferred to the broadcast file store 126 for storage to the file system, which is used to store and/or buffer the content transmissions as content data for the various television programs being captured by the users.

In an alternative embodiment, the content data are streamed as HTTP Live Streaming or HTTP Dynamic Streaming. These are streaming protocols that are dependent upon the client device. HTTP Live Streaming is a HTTP-based media streaming communications protocol implemented by Apple Inc. as part of its QuickTime X and iPhone software systems. The stream is divided into a sequence of HTTP-based file downloads.

FIG. 2 is a block diagram showing one implementation of the antenna array 102 that includes different subarrays 802, 804. Generally, different subarrays capture terrestrial broadcasts from different broadcasting entities 806, 808.

Each of the subarrays 802, 804 is comprised of hundreds or thousands of antennas elements 102-1 to 102-n, and tuners 104-1 . . . 104-n. Generally, the antenna elements and tuners are mounted on printed circuit boards (PCB) and located within an enclosure or housing. Depending on their orientation and location, different antenna subarrays 802, 804 are optimized to receive broadcasts from different broadcasting entities 806, 808. This is because different television networks use different broadcasting entities or antennas 806, 808 for generating the radio frequency transmissions or carrier waves that encode the over the air broadcasts. Typically, the broadcasting antennas 806, 808 are often physically located in different places distributed around most metropolitan areas, on one hand. It is preferable that the antenna array 102 be physically small and have a high antenna density, on the other hand. This leads to the desire to make the antenna elements 102 physically small. Small antennas, however, typically are low power gain. Therefore, in one embodiment, the system 100 includes two or more antenna subarrays 802, 804 that are physically separated from each other so that they can be collocated with the transmission towers of different broadcasting entities 806, 808, from which the over the air broadcast transmissions are to be detected by the system 100.

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In operation, the antenna optimization and control system **116** determines which antennas subarray **806**, **808** is optimized to receive a desired content broadcast from the broadcasting entity **806**, **808** based on a variety of factors including the location of the broadcasting entity, the location of the antennas subarray, and/or the signal strength received by the subarray. The antenna optimization and control system **116** then assigns an available antenna element **102** within the best-located subarray **802**, **804** to receive the desired broadcast content.

Further, in some embodiments, the antenna subarrays **802**, **804** are further preferably organized into groups according to frequency range: VHF and UHF, since the physical requirements of the antenna elements are different depending on the frequencies that they are able to receive.

With reference to FIGS. **1** and **2**, the arrangement of the antenna elements **102** in each of the subarrays **802**, **804** is similar to a phased array antenna in some ways. However, in a phased array antenna, the antenna elements are typically driven from a common source or connected to a common detection channel to produce a controlled radiation emission or detection pattern. In contrast, in the current system, the different antenna elements **102-1** to **102-n** have separately addressable tuners **104-1** to **104-n** and are controlled and optimized to receive different over the air broadcasts at different frequencies and possibly from different broadcasting entities **806**, **808**, simultaneously. Additionally, the different antennas **102-1** to **102-n** and tuners **104-1** to **104-n** are able to simultaneously capture multiple copies of the same broadcast of content transmission; this occurs when different users want to record or watch the same television program. As a result, each user has a unique copy of broadcast content data, which is generated from a different antenna and which is then separately stored in the broadcast file store **126**. Moreover, should one of these antenna elements be physically or electrically compromised and therefore disabled, that particular user's stream will cease to be generated and received.

FIG. **3** is diagram of a card cage structure **151** housing antenna array PCBs (or PCB antenna arrays) **152-1**, **152-2** . . . **152-n**.

In the preferred embodiment, multiple PCB antenna arrays **152-1** to **152-n** are installed in card cage structure or housing **151** and the antenna elements **102-1**, **102-2** . . . **102-n** are orientated horizontally. The card cage **151** is typically an enclosure or structure that provides mechanical support and protection of the PCB antenna arrays **152-1** to **152-n** within its enclosure. The card cages **151** are generally designed to allow PCBs to be easily installed and/or removed. Additionally, multiple card cages are often housed in rack mounted chassis (not shown) to further increase the density of antenna elements in the location where the card cages are placed.

The side, top, bottom and any front walls **150** of the card cage structure **151** are fabricated from a non-conductive material or with as few conductive materials as possible to minimize Faraday shielding. The front wall (shown removed) of the card cage **151** provides an access panel to enable installation and removal of the PCB antenna arrays **152-1**, **152-2** . . . **152-n**.

The rear wall or section includes the data transport interfaces, such as an nx10GbaseT optical data transport connector to transfer the data the transcoders, and connectors providing mechanical support for the PCBs antenna arrays **152-1** to **152-n**. In a typical implementation, the card cage **151** houses up to 8 or up to 32 PCB antenna arrays. In alternative embodiments, however, greater or fewer PCBs antenna arrays are housed within the card cages.

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The PCBs antenna arrays **152-1** to **152-n** are generally spaced about an inch (2.5 centimeters) apart within the enclosure. This distance enables a relatively high density for the PCBs antenna arrays **152-1** to **152-n**, while reducing unwanted interference between antenna elements to acceptable levels. Additionally, the arrangement of the multiple PCB antenna arrays within the enclosure creates a three dimensional array of antennas to maximize the number of antenna elements in the location where the card cages are placed.

The antenna elements **102-1** to **102-n** within the card cage **151** are orientated horizontally to create a horizontally polarized half omni-directional antenna array.

If the signal transmitted from the broadcasters has a vertical polarization, which occurs in some locals, then orientation of the antenna elements **102-1** to **102-n** should be changed.

The PCB antenna arrays **152-1**, **152-2** . . . **152-n** are fabricated from a dielectric insulator material. The components are mounted to a PCB and are connected via conductive pathways (or tracks) on the PCB. In one embodiment, the PCBs are approximately 25 inches wide by 21 inches long, or about 0.6 meters (m) by 0.5 m.

FIG. **4** is a top view diagram illustrating a two dimensional array of antenna elements **102-1**, **102-2** . . . **102-n** (shown as an array of squares) in the PCB antenna arrays **152**.

In a preferred embodiment, antenna elements **102-1**, **102-2** . . . **102-n** are mounted to both sides of the PCB **152** in a two dimensional array. Note that in FIG. **4**, only the antenna elements in the right-most column are labeled. Each antenna element **102-1**, **102-2** . . . **102-n** is an electrically balanced symmetric loop, in one implementation. The antenna elements are tightly spaced, much less than 0.1 wavelength ( $\lambda$ ) apart on the antenna section of the PCB. In a preferred embodiment, the antenna elements **102-1**, **102-2** . . . **102-n** are low power gain antennas. Low gain antennas are preferred because they have a wide radiation pattern that does not need to be aimed precisely at a transmitting entity and is generally required for highly integrated arrays at these frequencies/wavelengths.

Further, the antenna elements may be preferably arranged on different PCBs according to frequency range because the physical characteristics of the antenna elements are different depending on the frequencies that it is designed to receive. Thus, the PCB **152** includes VHF or UHF antenna elements. In an alternate embodiment, antenna elements may be multiply resonant, and may be on the same PCB.

The antenna elements **102-1**, **102-2** . . . **102-n** are connected with solder to the electronics section **154** of the PCB antenna array **152**. A ground plane **810** is provided in the electronics section **154**. In a preferred embodiment, the conductive metal ground plane begins at this electronics section and extends in both directions.

Carrying the signal from each antenna element **102-1** to **102-n** to the radio frequency tuner **104-1** to **104-n** and demodulator **106-1** to **106-n** are balanced transmission lines **812-1**, **812-2** . . . **812-n**. In one embodiment, each individual antenna element **102-1**, **102-2** . . . **102-n** is connected to a corresponding radio frequency tuner **104-1**, **104-2** . . . **104-n** and demodulator **106-1**, **106-2** . . . **106-n**. Thus, there will be the same number of antennas, radio frequency tuners, and demodulators.

In an alternative embodiment, there are more antenna elements than tuners such that antennas may be assigned to tuners as needed. This enables the system to provision either stream without prejudice or delay. It further helps to provide an economical method so that a user may be guaranteed that their particular antenna throughout the duration of their

In still other implementations, the PCB antenna arrays **152** and their antenna elements are different sizes. In one example, the area of the PCB antenna arrays **152** is reduced by about  $\frac{1}{4}$  (possibly  $\frac{1}{8}$ ) of the present area or less. In terms of the antenna elements **102**, when configured as a square loop, the 3 sided length is preferably less than 1.7 inches (4.3 cm), for a total length of all 4 sides being 2.3 inches, (5.8 cm). In

Each users' geographical location can be determined and confirmed using a number of different methods. In one example, each user's location will be determined by the user's Internet Protocol (IP) address. In other examples, it is entered by the user when they create an account or is determined when the user provides a zip code. Likewise, information from mobile phone towers being accessed by the user or by latitude and longitude coordinates from a global positioning system receiver within the user devices are also used in

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other examples. This geographical location information enables the web application server **124** to present each user with information based upon the user's actual or home market location.

The geographical information is required because different content is broadcast at different times between different television markets and some content is only available to users in specific geographic markets. For example, some content available in New York City is not available to users in Los Angeles. Moreover, in some implementations, the system enforces localization such that the users can only access content transmissions from their home market or that would otherwise be available to the users if they had their own antenna that they maintained on their house or other domicile.

In the next step **314**, the users are able to select what content type they want to access from their individual user account. Each user is provided with their own individual account through which they access any live content streaming or set up future recordings to be associated with the user's account. Likewise, playback of previously recorded content is done from the user's account and only content associated with the user's account is accessible by the user.

If the user selects content that the user previously recorded, then the user is presented with the pre-recorded screen in step **316**. If the user selects future recording, then the user is presented with the future recording screen to set up a future recording in step **320**. If the user selects live streaming content, then the user is presented with the live stream screen in step **318**.

FIG. **8** is flow diagram illustrating the steps for users to watch their previously recorded content from the streaming server **120**. The users begin at the pre-recording screen that is served to the user devices from the application web server **124** in step **316**. This is often a web page. In other examples, a propriety interface is used between the application web server **124** and an application program running on the user devices.

In the first step **402**, the users are presented with a list of their previously recorded content data. Users are only able to see the content data, e.g., a television program, that they instructed the system **100** to record. In some examples, the application server **124** suggests over the air content that the users might be interested in watching or recording. Nevertheless, the users must initiate the requests to record and save the broadcast content.

In the next step **404**, the user selects previously recorded content data to add to a playlist. The streaming server **120** locates the user's unique copy of the previously recorded content data in step **406** in the broadcast file store **126**. In the next step **408**, the streaming server **120** determines the resolution that will be presented to the user based on the user's device. In alternative embodiments, users are able to select the resolution regardless of device.

In another alternative embodiment, the client device automatically selects the highest resolution that the communications path can reliably provide.

In the next step **410**, the streaming server **120** streams the content data or recorded television program in the playlist to the user's device until the user's playlist is complete.

FIG. **9** is flow diagram illustrating the steps for users to schedule future recordings of an over the air broadcasts.

The users begin at the future recording screen that is served to the user device from the application web server **124** in step **320**.

In the first step **204**, the application server **124** determines and displays available local content to the user based on the geographical location information (obtained in step **312** of FIG. **7**) to enable localization. Typically, the user is presented

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with a list of available television networks, current broadcasts, and times and dates of future broadcasts.

In the next step **206**, the user's request for content is sent to the application server **124**. The application server **124** then schedules resources to be available at the time of the content broadcast or notifies the user that resources are currently unavailable in step **208**. Then the application server **124** directs the antenna optimize and control **116** to allocate the best available antenna element at the time and date of the desired content broadcast in step **209**. In the case where a user's antenna is assigned permanently this step is skipped, however. In the next step **210**, the antenna optimize and control **116** associates the antenna and receiver, and demodulates the broadcast content into MPEG-2 format.

The system **100** enables each user to separately schedule future recordings of broadcast content. Additionally, each user is allocated an individual antenna to receive that broadcast content. Further, and generally, the application server **124** schedules recordings based on each users' command so that there is always the same number of recordings as scheduled requests. This applies even when two users request recordings of the exact same content transmission; the system captures and stores separate content transmissions for each user individually so that each user has their own unique copy in the file store **126** that was generated from a separate antenna element.

In the next step **212**, the content transmission is transmitted through multiplexor and demultiplexor to an assigned transcoders that is part of receiver. In the next step **214**, the assigned transcoder **112** generates both a high rate/resolution and low rate/resolution video stream of transcoded content transmission data. In a current embodiment, the transcoded content data are encoded into the MPEG-4 format and the audio is transcoded into AAC (advanced audio coding) format.

The transcoded content data are then transferred to the broadcast file store **126** in step **215** along with time index information at both the high rate/resolution and low rate/resolution video content data.

In an alternative embodiment, the transcoder **112** generates a tri-rate output. Generally, the tri-rate includes high, medium, and low rate/resolution outputs of the transcoded content data. Still other embodiments could have greater or fewer output rates. The different output rates/resolutions enable the system **100** to provide different quality video streams based on factors such as the network capabilities, the user device, and user selection, to list a few examples.

FIG. **10** is a flow diagram illustrating the steps for users to watch over the air content on user devices in real time, contemporaneously with the broadcast of the content transmission of the desired television programs.

The users begin at the live stream screen **318** that is served to the user devices from the application web server **124**. Based on the user's geographical location, a list of available over the air broadcasts of television programs is provided in step **602**. Additionally, the broadcast time and date are also displayed to the users. The users are able to select content to view and the users' requests for content are sent to the application server **124** in step **604**. The application server **124** requests assignment of an antenna element from the antenna optimize and controller **116** in step **612** of each of the users.

If the antenna and/or tuner are not available, then the application server **124** returns a busy screen to the users in step **614**. If antennas are available, then the antenna optimization and controller **116** selects the best available antenna to receive the over the air broadcasts in step **615** for each of the users' requests. The determination of which antennas to use is based

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on multiple factors. For example, the location of the broadcasting entity, the location of the antenna elements, the orientation of the antennas, and the signal strength are all factors used to determine which antenna element will be used. In the case where the user's antenna is permanently assigned, and there are insufficient resources to support the request, the system returns a busy screen.

After an antenna is selected and the over the air broadcast is received, it is processed by the encoder system 103. The content transmission is decoded into MPEG-2 format by the decoder in step 616. In the next step 618, the content transmission data are transmitted through the multiplexer 108 and demultiplexer 110 to the transcoders 112. Here, the assigned transcoders 112 generate both a hi-rate and low rate MPEG-4, in one example, and the audio is transcoded into AAC (advanced audio coding) format. The assigned indexer 114 stores the transcoded broadcast content data into the broadcast file store 126 along with time index information.

Next, the streaming server 120 buffers and streams the broadcast content data from the broadcast file store 126 to the users' mobile devices for the duration of the broadcast in step 622.

In one embodiment, antenna elements that are currently not used are allocated to receive content broadcasts or television programs that the system anticipates that users will want to watch in the near future. The feeds from these allocated antennas are not sent to any users. The generated content data are simply discarded by the system as they are generated or are written into a circular buffer in the file store that is continuously overwritten. However, when a user desires to watch one of these programs, the content data that are generated by the feed from the antenna elements are allocated to that user and streamed to that user.

The advantage of this approach is that when the user selects to watch a new television program or changes to a different television program in a live streaming situation, the system does not need to wait for the encoding pipeline to fill. Instead, the content data that were previously discarded are now simply sent to this user. This provides a smoother and quicker transition when switching between channels, e.g., channel surfing.

FIG. 11 illustrates how transcoded content data are stored for each individual user in the broadcast file store 126.

In the illustrated example, each record includes information that identifies the user and the transcoded content data. For example, a user identification field uniquely identifies each user and/or their individual user account. Every content transmission that is captured from over the air broadcasts and converted to content data is associated with the user that requested it. The content identification field identifies the title (or name) of the content transmission. Generally, the content name is the title of the program, show or movie that is being recorded. An antenna identification field identifies the specific antenna element that was assigned and then used to capture the user requested over the air broadcast. A network identification field specifies the broadcasting entity that broadcast the content transmission that was recorded. The video file field contains the transcoded content data or typically a pointer to the location of this data. The pointer specifies the storage location(s) of the transcoded and stored as high, medium and low quality broadcast content data. A file identification field further identifies the unique episode, movie, or news broadcast. Lastly, a time and date identification field records the time and date of the over the air broadcast.

By way of an example, User 1 and User 2 both have unique USER ID's and both have their individual copies of a televi-

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sion program. Likewise, both users have their own copy of the broadcast content data and the television program even though both users requested a recording of the same television program, at the same time, on the same network. User 1 is only able to view their content data stored to their USER ID and User 2 is only able to view their copy of the content data stored to their USER ID. Likewise, the specific antenna element that was assigned to each user is also recorded.

Additionally, the streaming server 120 is able to generate reports based on the stored broadcast content data and the identification fields. The reports include statistics such as usage by individual, usage by groups, total the numbers of users, number of active users, number of scheduled recordings, peak system usage, and total usage of the entire system, to list a few examples.

FIG. 12 shows an alternative embodiment of the system 100 for providing network access to antenna elements of an array.

In this example, the system 100 further includes a selector switch 105 that is controlled by the antenna optimize and control system 116 to selectively connect the antennas 102 and tuners 104 to available antenna processing pipelines.

In the system 100, the resources for demodulating and transcoding are pooled and shared by the antennas elements. This configuration enables the system to provide services to larger numbers of users with less hardware. Additionally, the density of antenna elements can be increased, while power consumption is reduced by removing demodulation and transcoding hardware that consume larger amounts of power and by having less resources idling in standby.

Pooling resources (or oversubscription) is an acceptable practice because users generally do not access the system at the same time. Typically, most users are not currently accessing the system: some users are viewing live streaming content, some are setting up recordings of future broadcast, and others are playing back previously recorded content. Thus, the system does not need to be provisioned to handle all users accessing the system simultaneously.

To enable the system to utilize pooled resources, the selector switch 105 or switching system is provided. The antenna optimize and control 116 controls the selector switch 105 to enable the over the air broadcast received by the antenna elements 102 to be demodulated and encoded by resources from the pool of resources. Once the demodulation and encoding resources are no longer required, they are returned to pool of resources.

Because there are more antennas than demodulating and encoding resources, the antenna optimize and control 116 must ensure that demodulation resources are available before allocating an antenna to a user or allowing the user to access their dedicated antenna. Therefore, when a user makes a request for content, the antenna optimize and control 116 determines if demodulation and encoding resources and antenna elements are available on the same antenna array PCB or whether demodulation and encoding resources are available on the same PCB and the user's dedicated antenna.

If antenna resources are not available on the same antenna array PCB, then the antenna optimization and control system 116 searches for resources on other antenna array PCBs. If no resources are available, then the antenna optimize and control 116 informs the application server 124 that the user's request cannot be completed at this time. Likewise, the application server returns a message to the user's device that the system is currently busy and requests cannot be completed at this time.

On the other hand, if demodulation and encoding resources are available, then the user is assigned an antenna element and

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the received broadcasts are transmitted to the available resources through a selector switch **105** (or switch matrix).

In an alternative embodiment, tuners **104-1** to **104-n** are also pooled. In this configuration, available tuners are assigned to antenna elements **102** as needed. The selector switch **105** is also used to switch the radio frequency output of the antenna and to select both the tuner and demodulator to be directly coupled together.

In a preferred embodiment, the signal inputs and outputs of the selector switch **105** are a low intermediate frequency signal, a high intermediate frequency signal, a baseband signal, or a digital representation of any of the foregoing.

While an equal number of antennas, tuners, demodulators, transcoders, and indexers are depicted, in a typical implementation, antenna elements outnumber the encoding resources of the processing pipeline approximately 3-4 to 1, in one embodiment. This configuration provides additional service to many additional users without concomitant increases in hardware resources.

In first mode of operation of the embodiments shown in FIGS. **1** and **12**, the antenna assignments are temporary assignments that last only as long as the users are actively using the system **100** to watch single television program, for example. If the system **100** assigns users antenna elements each time there is a user request to view or record an over the air broadcast. Thus, every time a user requests a different over the air broadcast, the system **100** typically assigns the user a new antenna element.

In second mode of operation, the antenna assignments are permanent assignments, e.g., dedicated to particular users. For example, antennas are leased to users for the duration of those users' accounts. In other examples, the antennas are actually sold to users.

If the system **1800** is configured to permanently assign antennas to users, then each user will always use the same antenna element to receive over the air broadcasts.

The embodiment of FIG. **12** is preferred for the second mode of operation because fewer demodulators **105** and possibly tuners **104** are required in the system **100**. When a user is not accessing their system, only their antenna element **102** is not fully utilized. The switch **105** enables demodulators to be reassigned to other active antenna elements.

If the system **100** is configured to permanently assign antenna elements and also utilizes pooled demodulation and encoding resources, there is the possibility that demodulation resources will not be available on the same antenna array PCB at certain times. In this scenario, the antenna optimize and controller **116** searches for available demodulators on other antenna array PCBs and controls the selector switch **105** to enable the antenna elements located on one PCB to connect to the demodulation and encoding resources located on other PCBs.

FIG. **13** is a flowchart that shows how the application web server **124** and antenna optimize and controller **116** allocate demodulation and encoding resources for a user when resources are pooled.

In the first step **702**, the antenna optimize and control **116** receives a request from the application server **124**. Typically, the requests are generated by users from their client devices **128**, **130**, **132**, **134**. After receiving the request from the application server **124**, the antenna optimize and control **116** searches for available resources.

In the next step **708**, the antenna optimize and control **116** determines if demodulation and encoding resources are available from the pool of resources on the same antenna array PCB as the antenna element that is assigned to the user making the request. If resources are available, then the antenna

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optimize and control **116** allocates the resources for the user in step **716**. Generally, this is accomplished by configuring the selector switch **105**.

If no resources are available, then the antenna optimize and control **116** searches for other resources on the other antenna array PCBs that are available to receive the requested content in step **710**. If the antenna optimize and control **116** is not able to locate any available antennas and/or demodulation and encoding resources on any other PCBs, then the antenna optimize and control **116** returns an busy message in step **714** to the application server. Likewise, the application server **124** will then return a busy message to the user requesting the content.

If antennas and resources are located on another antenna array PCB, then the antenna optimizes and control **116** configures the selector switch **105** in step **715** and allocates the available demodulator for the user in step **716**.

These steps would also be performed if the user requested to set up a future recording. The steps, however, would not be performed in real-time; rather they would be performed at the time when the desired content was being broadcast from the broadcasting entity. Additionally, the content would not be delivered to a user device. Rather, the content would be stored in the broadcast file store **126** to be accessed by the user at a later time.

While this invention has been particularly shown and described with references to preferred embodiments thereof, it will be understood by those skilled in the art that various changes in form and details may be made therein without departing from the scope of the invention encompassed by the appended claims.

What is claimed is:

1. An antenna system comprising:

a two dimensional array of antenna elements for separately receiving over the air broadcasts, the array of antenna elements having a density of at least 10 antenna elements per square meter; and

an encoder system for transcoding over air broadcasts received by the separate antenna elements into content data to be stored in a data storage system.

2. The system according to claim 1, wherein the antenna elements are omni-directional antenna elements.

3. The system according to claim 1, wherein the antenna elements are symmetric dual loop antenna elements.

4. The system according to claim 1, further comprising: multiple ones of the two dimensional array of antenna elements; and

a housing that supports the two dimensional arrays adjacent to each other.

5. The system according to claim 4, wherein the two dimensional arrays of antenna elements form a three dimensional array within the housing.

6. The system according to claim 1, wherein the two dimensional array of antenna elements and at least part of the encoder system are implemented on a common circuit board.

7. The system according to claim 6, wherein the encoder system comprises demodulators that are implemented on the circuit board.

8. The system according to claim 1, further comprising radio frequency tuners for tuning the antenna elements of the two dimensional array.

9. The system according to claim 8, wherein the two dimensional array of antenna elements and radio frequency tuners are implemented on a common circuit board.

10. The system according to claim 9, wherein the circuit board comprises at least 50 antenna elements.

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11. The system according to claim 1, wherein the antenna elements have a density of at least 50 antenna elements per square meter.

12. The system according to claim 1, wherein the antenna elements are hemispherical directional antenna elements.

13. A method for receiving over the air broadcasts with an array of antenna elements, the method comprising:

providing two dimensional arrays of antennas elements for receiving the over the air broadcasts, the arrays of antennas elements each having a density of at least 10 antenna elements per square meter;

stacking the arrays to form a three dimensional array of antenna elements;

receiving the over the air broadcasts with the three dimensional array of antenna elements; and

transcoding the over the air broadcasts into content data to be stored in a data storage device.

14. The method according to claim 13, further comprising implementing the two dimensional arrays of antenna elements and tuners for the antenna elements on a common circuit board.

15. The method according to claim 13, further comprising providing at least 50 antenna elements in the two dimensional arrays.

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16. The method according to claim 13, wherein the antenna elements have a density of at least 50 antenna elements per square meter.

17. An antenna system comprising:

a plurality of circuit boards, each of the circuit boards including a two dimensional array of antenna elements for separately receiving over the air broadcasts and an encoder system for demodulating the over air broadcasts received by the separate antenna elements, the encoder system transcoding the over the air broadcasts from MPEG4 encoding into content data;

a card cage for housing the circuit boards, and

a data storage system that stores the content data from the encoder system.

18. A method for receiving over the air broadcasts with an array of antenna elements, the method comprising:

providing two dimensional arrays of antennas elements for receiving the over the air broadcasts;

stacking the arrays to form a three dimensional array of antenna elements;

receiving the over the air broadcasts with the three dimensional array of antenna elements; and

demodulating and transcoding the over the air broadcasts from MPEG4 into content data to be stored in a data storage device.

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